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REGD. NO. TN/MS (C) 395

36th
YEAR OF
PUBLICATION

ISSN 0045/6500
R.N. NO. 1972/57

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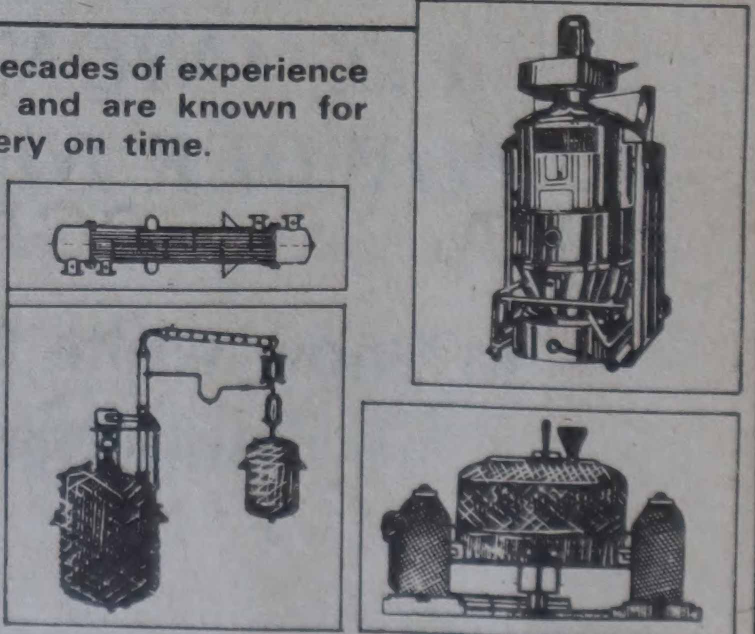

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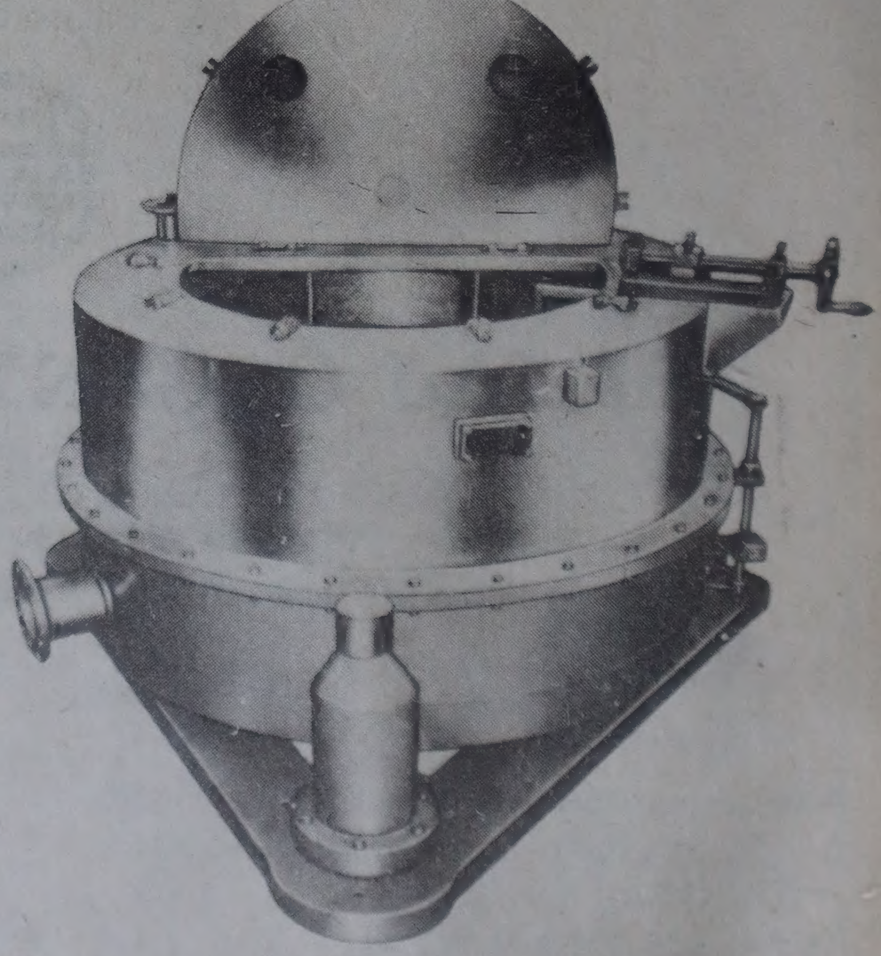

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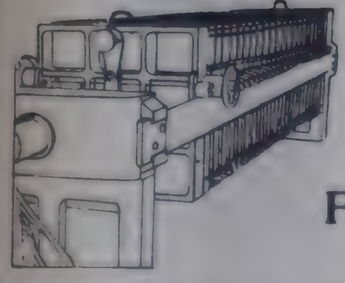

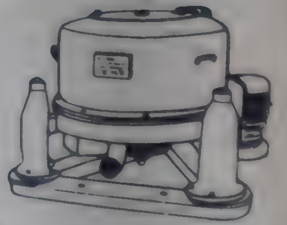

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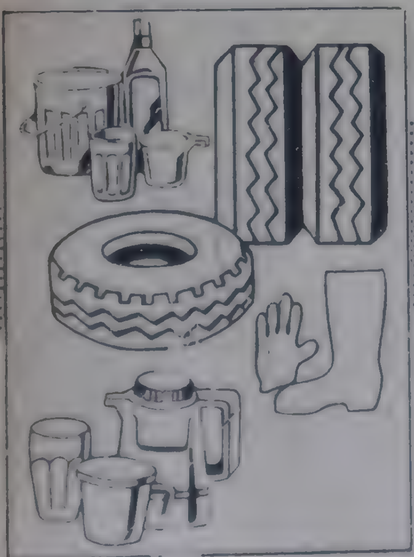

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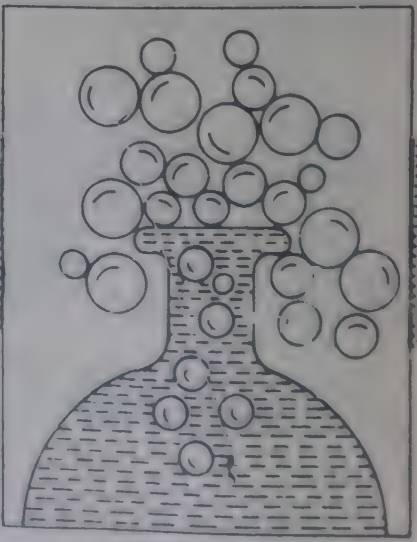

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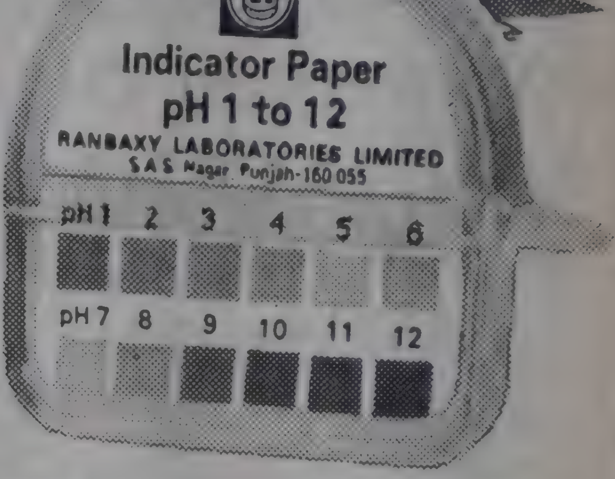

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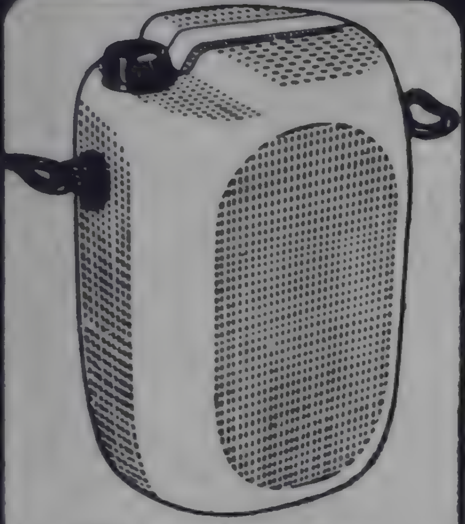
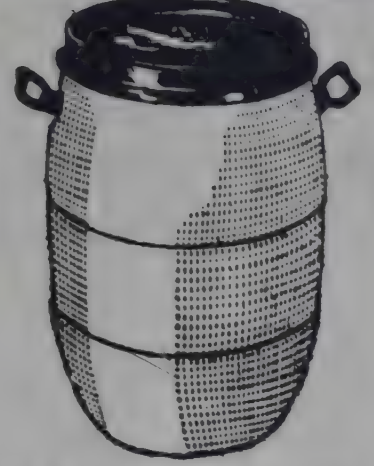
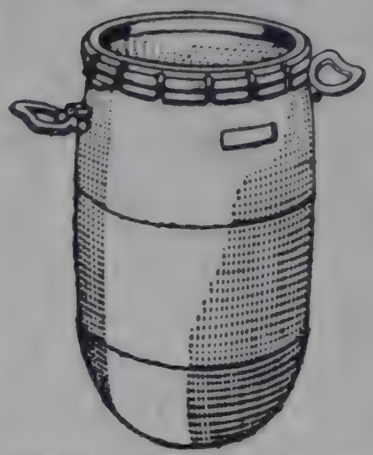


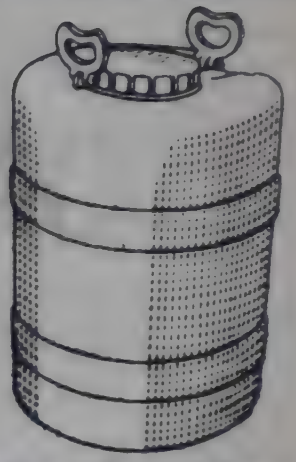
50 Ltrs. Jerry Can



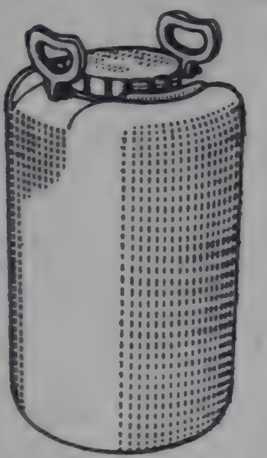
50 Kgs. Round Drum
Full Top Open – 12" Cap



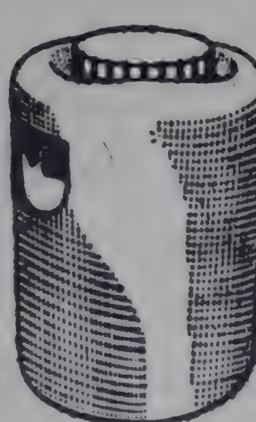
30 Kgs. Round Drum
Full Top Open – 10" Cap



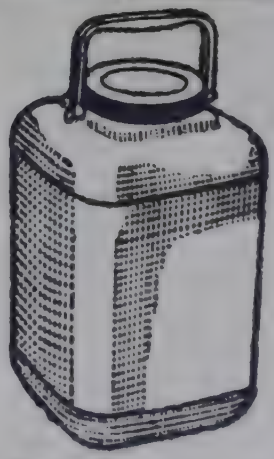
50 Kgs. Round Drum
– 6" Cap



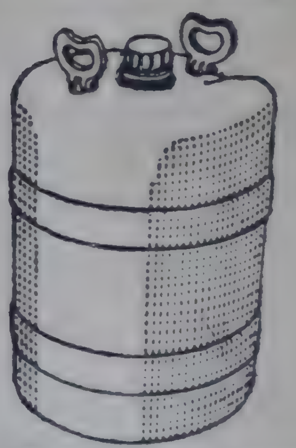
30 Kgs. Round Jar
– 6" Cap



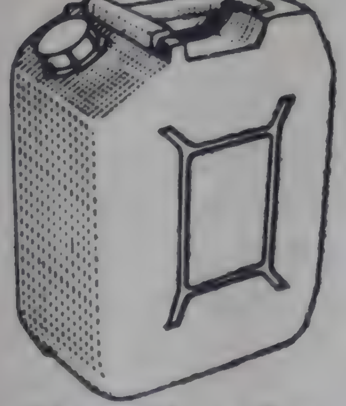
20 Kgs. Round Jar
– 6" Cap



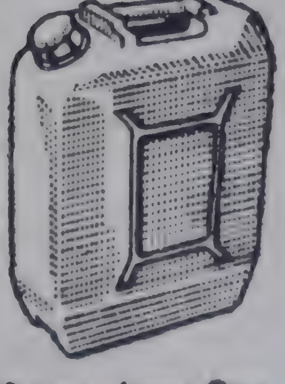
6 Kgs. Square Jar
– 4" Cap



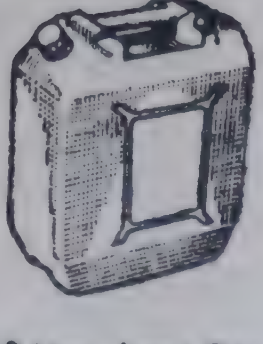
50 Kgs. Round Drum
– 2" Cap



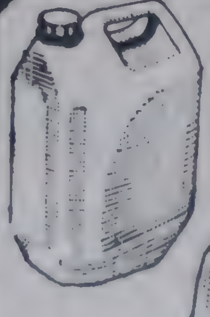
30 Ltrs. Jerry Can
Stackable



20 Ltrs. Jerry Can
Stackable



10 Ltrs. Jerry Can
Stackable



5 Ltrs.
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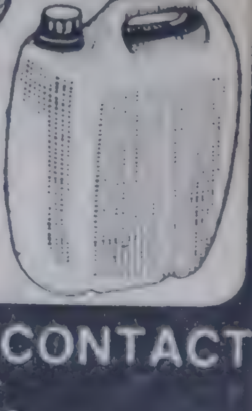

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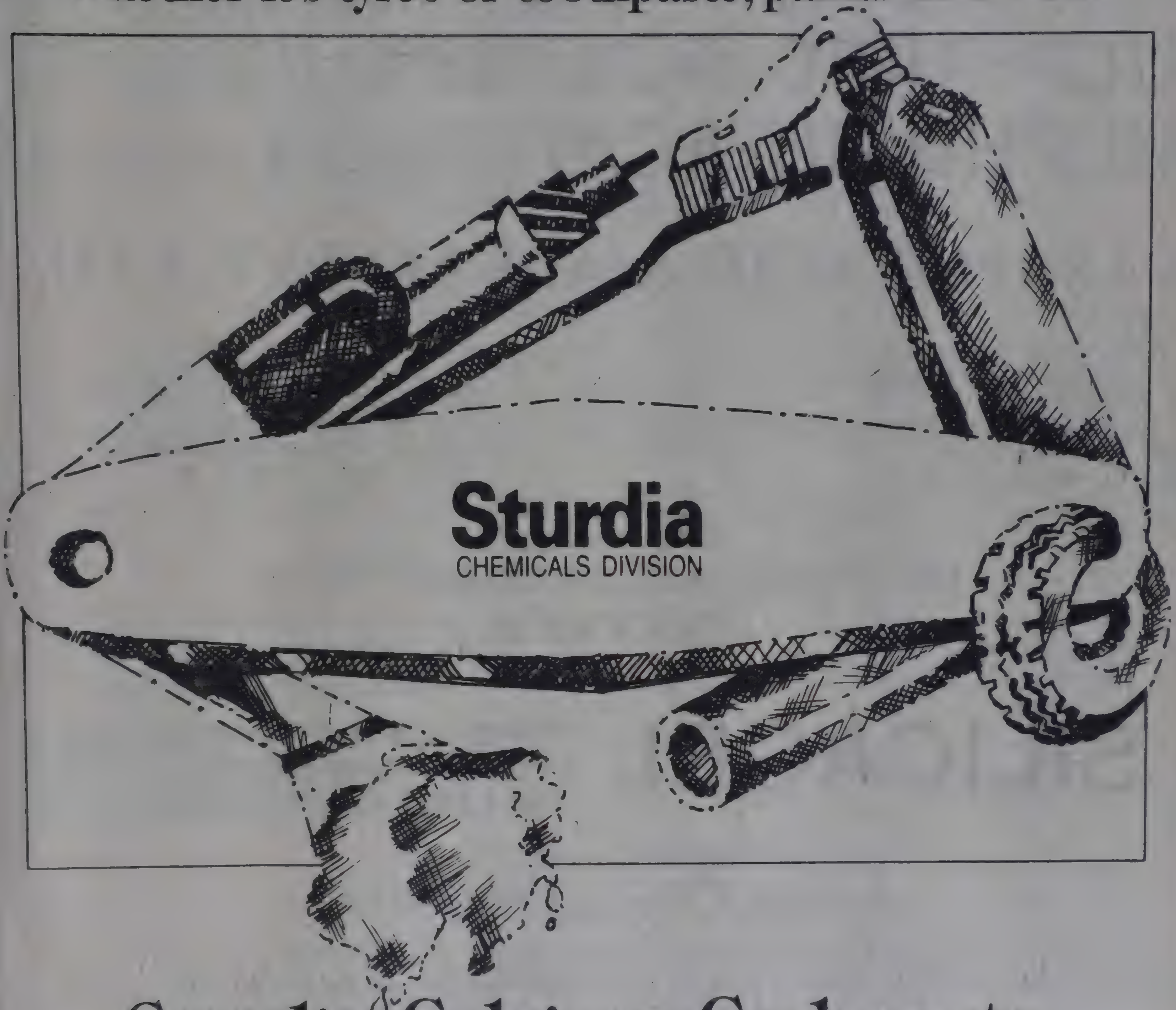

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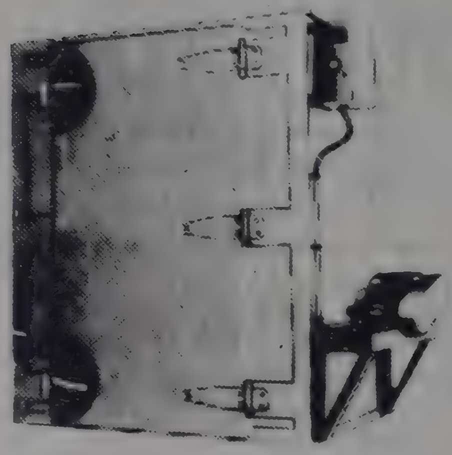

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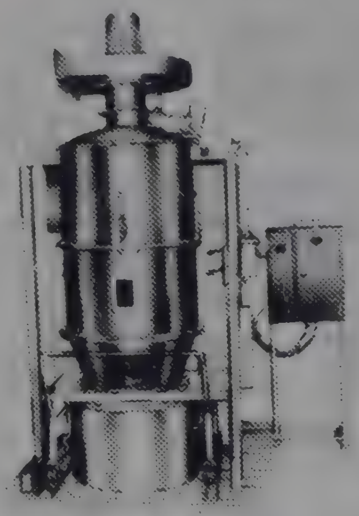

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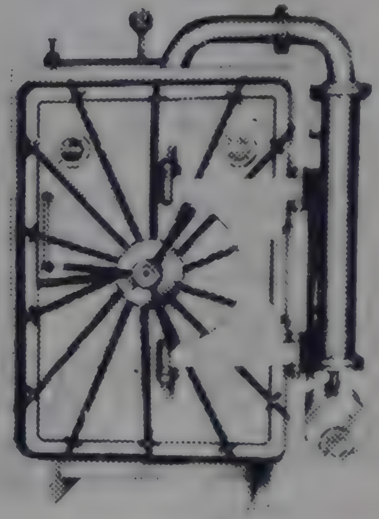

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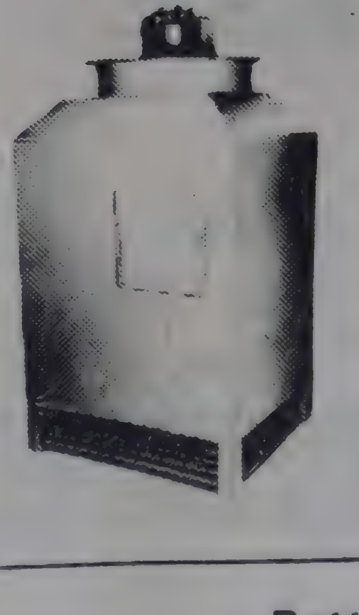

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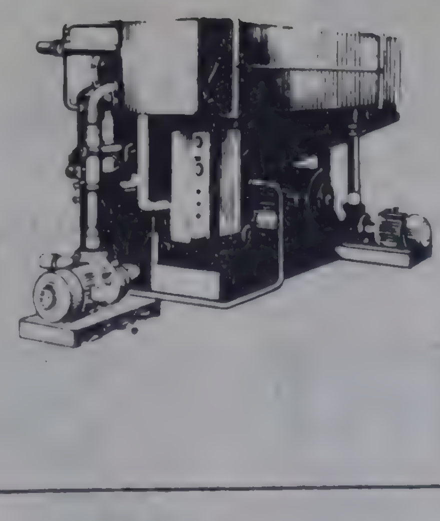

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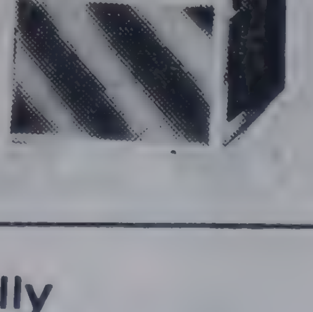

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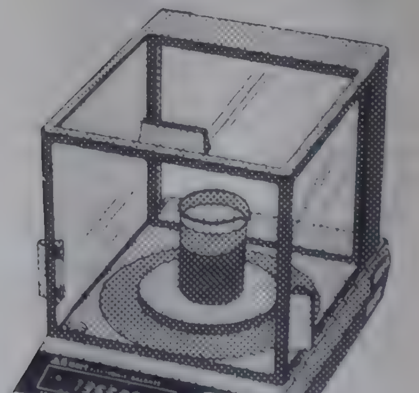

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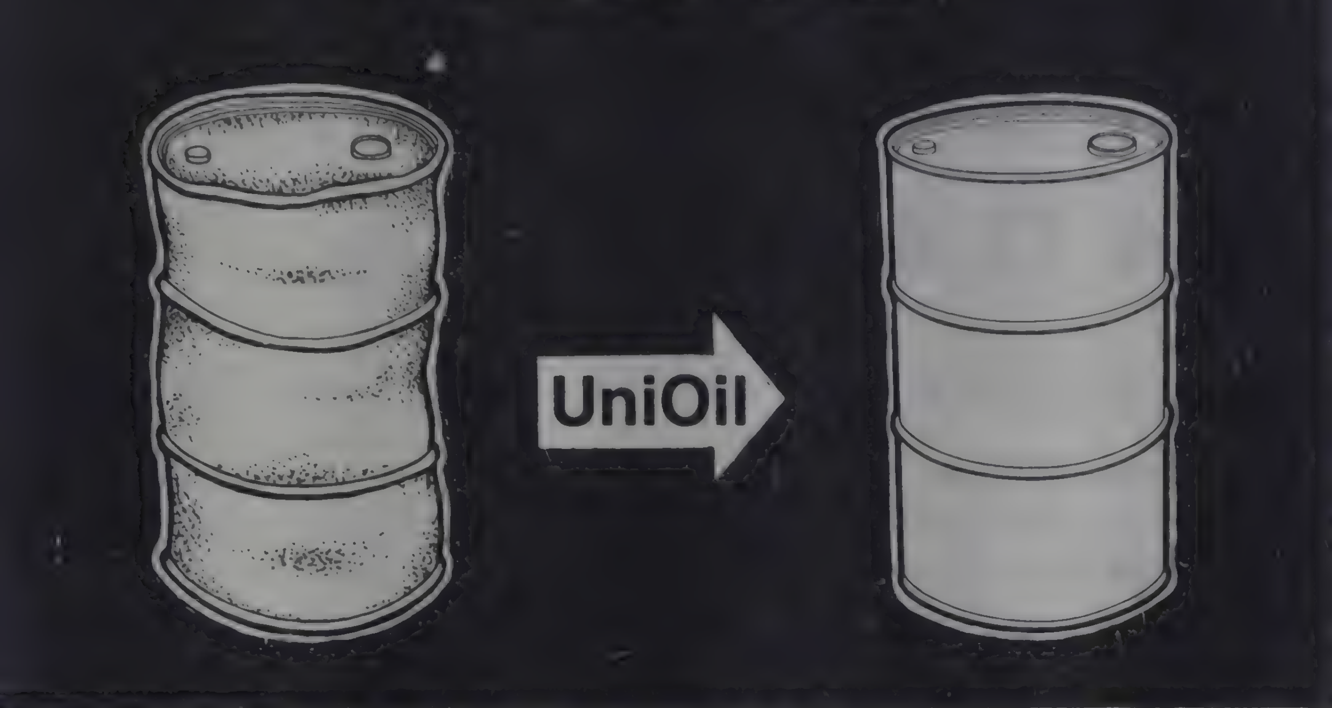

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Publishers:
SEVAK PUBLICATIONS

Editor - Publisher
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Advertisement Manager
N.R. RAJAGOPALAN

Administration/Circulation
VIJAY RAGHAVAN

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306, Shri Hanuman Industrial Estate
G.D. Ambekar Road, Wadala,
BOMBAY 400 031.
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Room No. 9, Wellingdon Estate,
3rd Floor, 24, Commander-in-Chief
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Telex: 041-6290 CWLY IN.

Printed at:
Sevak Publications,
25, North Mada St., Thiruvanmiyur,
Madras 600 041.

Fast Print Service,
307/308, Shri Hanuman Indl. Estate,
G.D. Ambekar Road, Wadala,
Bombay 400 031.

Subscription Rates:
(Inclusive of Postage)
India: Rs. 400.00
Foreign: US$ 175.00 (Air Mail)
US$ 75.00 (Sea Mail)

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CONTENTS

Heralding the 21st Century: Emerging trends in the transport of raw materials — Slurry pipeline — T.P.S. RAJAN 41
Chemarena — S.L. VENKITESWARAN 45

IN THE NEWS

Carew revises Vizag project 48
Thapar Nylon-66 proposal likely to be rejected 50
RIL seeks naphtha supply at original level 51
Plea against cut in naphtha allocation 51
CAPEXIL urged to set higher target 56
'Lok Shree' award presented 62
Lever's tech. to conserve industrial oils 68
1.16 lakh tonnes extra molasses to be exported 70

PHARMACEUTICAL CAPSULE

Bismuth and Glaxo's Zantac in ulcer war 54
Foreign outfit's closure: Chloromycetin shortage feared 54
Roche allowed to import four life-saving formulations 55
Drug companies' dues to be realised 56
Wockhardt to fund biotech research 57
Drug industry plea to lift control 57
Drug arrears: Industry demands independent panel 58
Lupin gets two more years to make rifampicin from basic stage 58
No diversification plan for Bayer 58

FERTILISER NEWS

FACT fares better despite constraints 65
FCI, HFC units revival to cost Rs. 284.80 crores 66
NFL, IFFCO allowed to double capacity 67

OIL & NATURAL GAS SCENARIO

Gulf surcharge may be levied on petrogoods 48
Five million tonnes more crude soon 71
Rs. 70 crore oil losses 71
Rs. 80 crores lost due to AASU oil blockade 72
ONGC proposals for Tripura 72
More petroleum items may be taken off OGL 74
IOC Kandla-Bhatinda pipeline plan okayed 75
ONGC to commercialise new technology 76
Cabinet panel reviews oil supply problems 76
Funds crunch affects work on Haldia Petro 77
Gas panel to ensure optimum use mooted 78

SAFETY AND ENVIRONMENT NEWS

World conference on human health and chemical accidents 52
Environ okay for NOCIL expansion 84

SPECIAL ARTICLE

Dyes and Dye Intermediates — Policies and Perspectives — K.R.V. SUBRAHMANIAN 105
Chemistry of Synthetic Surfactants — Prof. V.A. SHENAI 109

REGULAR FEATURES

Frankly Speaking — R & D — A Must for Survival — Dr. O.P. KHARBANDA 87
Highlights in Chemical Technology 91
Science Briefs 97
New Products 101

INTERNATIONAL SPECTRUM

Chemical News from Abroad 121
Chemical Markets Abroad 123
News from Japan 125
New Developments from Japan 129

MARKET INFORMATION

Bombay Chemicals Market 133
Bombay Drugs Market 138
Bombay Dyes Market 139
Delhi Market 141
Madras Market 142
Calcutta Market 142
Shipping News 143
Materials Imported/Exported 145

The dia. of pipelines in use or under consideration varies dely from 3" to 42", and the larger one would move about 000 tons per day and the smaller ones would move about) tons per day. The black Mesa line is of dia. 18" and ries 4.8 million tons per year.

The optimum speed range is five to six feet per second 1 miles per hour). Properly designed and operated slurs are nonabrasive at design velocity and non-corrosive. A nimum velocity above four ft per second must be mainned to keep the coal suspended in the slurry solution.

It ranges in size up to that of ground coffee. When the coal mixed with the carrying liquid, it has a uniform consistency.

Piston pumps push the slurry through the line. Pumps caple of providing up to 1700 HP are available to create 1000 /sq. inch pressure inside the pipe.

Water is the most commonly considered fluid. Other fluids n be used but it depends upon availability. Some fluids der consideration include waste mine-water, saline water, , municipal and industrial wastewater, and methanol.

Limiting Factors. Any size from lumps to super fines, can transported successfully by pipeline, but the economics pumping the different sizes vary widely, the cost increasg with the size of coal, but not proportionately. This is the ief reason for the pumping of only crushed and screened al by the three operating coal pipelines, and the biggest stacle to the large-scale adoption of pipelines to transport mp coal for general use.

With an average particle size of less than 0.04 mm, the urry is homogeneous and the unit pressure drop along the peline due to friction is similar to that of a simple liquid the same specific gravity and viscosity. Under these contions, prediction of the performance characteristics of the peline is relatively straightforward. With a particle size of ove 0.05 mm, the slurry is heterogeneous; and the flow aracteristics differ greatly from those of a homogeneous quid, with increasingly higher unit pressure drops.

Experiments have indicated that for a heterogeneous coal urry with an average particle size between 0.05 mm and 2 mm, the particles are in suspension, but above this maxium size, the slurry tends to stratify, the coal sliding along e lower half of the pipe as a solid bed.

Solids content. The percentage solids content of the slurry obviously of primary importance to the economics of a al pipeline. For a given diameter of line, it is evident that e throughput of coal will vary directly with the solids con- requirements. Alternatively, a higher solids content will require a less total amount of slurry throughput for a given weight of coal, thus theoretically necessitating a pipeline of less diameter. But the maximum percentage solids content is a function of the other relevant design factors and cannot be arbitrarily decided without due consideration of the coal characteristics, flowing velocity and unit pressure drops, etc. Generally speaking, the smaller the average particle size, the higher the solids concentration.

Pipeline materials. Many different pipe materials have been used for short-distance solids pipelines, including wood staves, cast iron, wrought iron, concrete and steel, each of which has merits and disadvantages. The high pressures demanded for economical operation of long distance coal pipelines limits the choice for this duty to steel, however. The pipes are not coated internally, since the heavy frictional effect of the slurry would damage such a coating and render it useless as a corrosion preventer, while the same frictional effect quickly polishes the internal pipe surface and minimises pressure losses from this cause. To compensate for pipe metal losses due to this heavy friction, the wall of the pipe is specified thicker than for a comparable oil or water line, and an inhibitor is introduced into the process water to minimise corrosion.

Dewatering the slurry to a specified maximum water content after hydraulic transmission, poses as many technical problems and certainly more economic problems than hydraulic transmission itself. This is indeed the key to the whole situation, and a simple, economical solution would do more than anything else to make long-distance coal pipelines.

Railroads tend to be more inflation-sensitive as about 80 per cent of their costs are variable.

Slurry pipeline variable costs are about 20 per cent of the total cost. The pipeline is the more direct. It can go up a 12 degree grade, whereas the maximum grade for a railroad ranges from one to three degrees. Even in level terrain, the pipeline is more direct as railroads historically were routed to serve all intermediate towns and population. This means that a pipeline can connect points A and B more directly, thereby reducing the cost.

The most significant of the users include electric utilities whose large volume, long distance movements of coal best utilise the economies offered by slurry pipeline transportation. A fully loaded slurry pipeline could effect substantial savings over rail-delivered coal (of the order of 1/3 cost of rail) which when measured in most important terms-impact on our customers would amount to crores of rupees consum-

The US Senate hearings on coal slurry pipelines show that pelines require 75 per cent less steel than railroads. Slurry ipelines also use 1.5 per cent less coal energy for transportation than do railroads.

A slurry preparation plant requires 100 acres of land and ach pumping station requires an additional 50 acres. The and above the pipeline is put back to use. Railroads require ixed facilities. A new rail line between two points, say, 112.5 niles apart will cause a permanent loss of 2,950 acres of land.

Steel: A 1,000-mile, 25 million-ton pipeline requires 428,000 tons, while the equivalent rail operation requires 7,79,000 tons over 30 years. Steel from both can be re-cycled.

Energy: Using the latest techniques, trains and pipelines each will use about two per cent of the raw energy in the coal being moved. Both are energy efficient, but pipelines use electricity made by domestic coal while in rail diesel oil consumption increase.

Land: Nearly all the land is restored over a pipeline right-of-way. A rail line occupies its right-of-way full time.

William Bros Engineering Company, Oklahama have developed a new concept STAB-FLO stabilised slurries which will permit long distance transport of coal upto 20 mm with considerable reduction in water requirement. This is important since dewatering of fines is a very difficult operation.

Alternative slurry media. Currently research is being directed into the use of alternatives to water for slurry transport systems. In particular, oil, methanol, ethanol and liquid CO_2 are being considered for coal transport systems. The most promising developments appear to be in the use of methanol and liquid CO_2 is being studied by Arthur D. Little in the US and a feasibility study into transporting coal at the rate of 40 million t/a over a distance of 800 km has been conducted by the University of the Witwatersrand, South Africa.

Liquid CO_2 provides many advantages, including the use of coal discards to produce the CO_2. The rheology of the CO_2 coal slurry is such that extremely low energy is required to effect transportation. Further, no dewatering problems will be experienced at discharge. The CC_2 could be sold at the terminal point, or it could be returned via a second pipeline to the feeding point. In the South African study, it has been suggested that the liquid CO_2 be allowed to expand through turbines for power generation. This is particularly attractive since the proposed terminal station is located far from the electricity source.

Extensive studies have been the conducted into the ec nomics and technical feasibility of the so-called methaco pipeline. This slurry pipeline would be used to transport co in a methanol liquid.

Tests have indicated that the methanol/coal slurry has rh ological properties different from the water/coal slurries. F the same coal size distribution and a 45 per cent weight co centration, the relationships between methanol and water slu ries are:

Variable	Methanol versus water slurr
Viscosity	4% lower
Velocity	15% higher
Friction losses	15% higher
Pumping energy	32% higher
Pay load	222% higher

Hydrocapsule. A variation of the hydrocapsule systen the Aquatrain concept, is being developed by W. R. Grac in the U.S. Essentially the system exploys long slender plas tic bags filled with pulverised coal. The plastic bags togethe form a train, each bag being about 4 m long.

The bags are transported in a 900 mm pipe and water wi be used as the conveying fluid. This concept will provide pollution free transportation system in which contaminatio of the carrier fluid is prevented.

The feasibility of a long distance pneumatic coal transport system in which pulverised coal is transported in coa gas has been studied. The coal together with the coal gas wi provide a high energy fuel adequate to feed a 1,000 MV power station.

Initial studies include the design of a 500 km. pneumati conveying system in which low grade coal is gasified an cleaned and used to transport the high quality clean coal. Provision is made for intermediate stations in which the coal an gas are separated, the gas recompressed and once again mixe with the coal.

In order to control velocities, a telescopic pipe has bee proposed varying in size from 250 mm to 750 mm in diameter over a distance of 50 km. The gas is introduced at pressure of 8,400 kPa and allowed to expand to a pressur of 3,500 kPa before re-compression. The system has bee designed to operate at mass flow ratios of the order of 1.33

— T.P.S. RAJA

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S.L. VENKITESWARAN

MTBE surge goes on

The phenomenal growth in MTBE in the last few years has already been referred to in these columns. It is the fastest growing chemical in the world and continues on the fast track and incidentally as a major outlet for methanol. Unlike TEL which was used in grams per US gallon for raising octane rating, MTBE is used in several percentage points in volume of gasoline, set only by the prescribed maximum oxygen content of the fuel. While methanol is derived from methane/natural gas, MTBE needs isobutylene from C_4 fractions of refinery or LNG sources -- both avoid the need for liquid petroleum fractions. Some excellent data on the status of MTBE capacity and production region-wise is provided under HP Impact of *Hydrocarbon Processing* of April 90 and are reproduced in Tables 1 and 2. It is dealt with in barrels per day capacity in USA but the data give both bbl/day and tonnage.

Table 1

EXPECTED EVOLUTION OF MTBE CAPACITY (kt/y)

	1989			1992
	In operation	**Under construction**	**Planned**	
Western Europe	2,124	--	550	2,674
Eastern Europe	290	--	350	640
United States	3,985	485	835	5,305
Canada	--	--	1,000	1,000
South America	120	540	50	710
Middle East	530	--	50	580
Far East	255	--	501	756
Total	7,304	1,025	3,336	11,665
No units	54	8	21	83

The investments and production costs for MTBE in US Gulf Coast, Middle East and Latin America are also g in Table 3 -- based on dehydrogenation of C_4 as estim by DeWitt's MTBE/oxygenates Annual. Arco is the lar producer but had a mishap in their US plant which has u supplies. Their strength is in the process for propylene o in which isobutylene is a coproduct and then converte MTBE.

Table 3

PRODUCTION COSTS FOR MTBE PLANTS, BUTANE DEHYDROGENATION TECHNOLOG

(Dollars per metric ton, 1984 condit

	Gulf Coast	**Middle East**	**L Ame**
Capital cost	$300	$465	$
Variable costs	$230.04	$153.36	$14
+ Fixed costs	21.28	38.97	2
= Manuf. total	251.32	192.33	16
+ Freight to U.S.		39.00	3
+ Importy duty		21.46	
+ Sales/delivery	7.86	11.30	1
= Cash costs	259.18	264.09	21
+ Depreciation	30.00	23.26	3
= Full costs	289.18	287.35	25
Gross margin	95.72	97.55	13
- Income tax	32.54		4
= Net profits	$63.18	$97.55	$8
ROI	21.1%	21.0%	24

Table 2: **WORLDWIDE MTBE CAPACITY**

	1986		1987		1988		1989		1990		1991		1992		1993		19
	-000- Mt/y	Bbl day	-000- Mt/y	Bbl day	-000- Mt/y	Bbl day	-000- Mt/y	Bbl day	-000- Mt/y	Bbl day	-000- Mt/y	Bbl day	-000- Mt/y	Bbl day	-000- Mt/y	Bbl day	-000- Mt/y
Total US	1,927	47,200	3,495	82,200	3,842	90,400	3,986	93,800	5,571	131,100	7,016	165,000	8,186	192,500	8,186	192,500	8,654
Total Asia/ Middle East	192	4,550	242	5,740	784	18,488	903	21,258	953	22,458	1,408	33,168	1,908	44,918	2,208	51,918	2,208
Total East Europe	291	6,930	291	6,930	291	6,930	291	6,930	291	6,930	291	6,930	1,001	23,530	1,001	23,530	2,501
Total West Europe	1,022	23,610	1,432	33,240	2,125	49,610	2,125	49,610	2,645	61,600	2,645	61,600	3.145	73,350	3,145	73,350	3,145
Total Canada &	[illegible]	[illegible]	120	2,800	120	2,800	120	2,800	660	15,490	660	15,490	2,150	50,540	2,905	68,290	2,905

ia is to take up construction of a small 25,000 tpa plant 3PL refinery in Bombay. Several other projects have been 1-starters as the critical need is of butanes whereas BPL pects to get enough C$_4$ for this project from the new C$_4$ fractionation unit set up to provide C$_3$ for the MGCC cker. In view of the serious situation on petroleum which ifronts us there is urgent need to go for as much MTBE possible using the LNG expected and the large potential methanol. The oil rich Qatar is going in for an integrated oject with 2,000 TPD methanol and 500,000 TPA of MTBE association with Neste of Finland.

Incidentally the latest estimate of usage of methanol world de for different products is said to be as given in the table ongside

(in thousand tonnes)

Methanol used for	1989	1990	1993
Formaldehyde	6901	7082	7630
MTBE	2197	2426	4055
Acetic acid	1213	1362	1635
Solvents	1288	1334	1456
D.M.T.	637	647	670
Methyl methacrylate	492	494	585
Fuels (direct)	195	265	235
Others	4408	4809	5151
Total	17347	18419	21416
Capacity for methanol	22123	22513	24776

US price was a low 30 cent/gallon or about 4 cent/lb.

Polyurethanes -- growth continues

A recent analysis of the demand for polyurethanes fore-sts growth at 4.4% a year until 1993 for North America. ransport, construction, household markets and foamed ades enjoy strong demand and new generation elastomers e penetrating some areas. CFC's used as blowing agents r foam are under strict regulation and newer items are taking ver. There is balance between capacity and demand which ill continue with expansions and debottlenecking of capac-ies. Production was of the order of 1.5 million tonnes in 988 and is set to rise to 2.3 million by AD 2000 and exports e about 3%. The market-wise usage is estimated as under:

(million lbs)

olyurethanes	1988	1993	2000
or Household	1098	1315	1700
or Construction	762	925	1200
or Transportation	669	935	1210
or Packaging	128	145	190
ther markets	564	680	875

There are a spate of new projects for isocyanates elsewhere to cope with demands. Shell Chemicals is to link up with Mitsui for an MDI project of 50,000 tonnes in Europe at an estimated $ 200 million. This is to meet the demand beyond their half share of a present joint venture with Bayer -- under the name Bayer Shell Isocyanates making both TDI and MDI. Mitsui Toatsu is taking up a 55,000 tpa project for MDI in Japan. Capacity build ups in Europe are as below:

Dow with 60,000 in West Germany
Bayer with 60,000 in Spain
BASF with 120,000 in Belgium
Montedipe with 30,000 expansion in Italy.

Projects for Far East have not been fixed except of Mitsui group.

India is now on the verge of a decision on TDI/MDI projects for which technology tie ups are expected.

India's acute problems in sulphur

A fall out of the Iraq war extends beyond petroleum to asic chemicals linked to oil -- particularly sulphur for which is reported that India has been banking on Iraq/Kuwait for ie bulk of supplies -- perhaps 160,000 tpa.

Iraq produces sulphur from deposits by the Frasch pro-ess while Kuwait recovers a large quantity from refineries. oth sources are shut out by UN sanctions and perhaps Saudi Arabia may come to the rescue with about its million tonnes a year recovery plants. Prices are sure to go up from $ 90 per tonne ex Al Jubail.

India used to get sulphur from Poland but with the changes in Eastern Europe and the end to Rupee Trade with that area there is not much hope. France is a larger producer of sulphur from natural gas besides Canada with its large output.

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Gulf surcharge may be levied on petrogoods

The Union government is seriously nsidering a proposal to levy a Gulf rcharge on sale of petroleum products the country. The surcharge will be posed on both imported and domes-ally produced petroleum products.

This will automatically lead to a gen-al hike in petrol prices and other lated items. The exact quantum of sur-narge and whether there will be any xemption for certain types of products vill be decided once the proposal, now eing considered at the highest level in ne government, gets the green signal.

According to official sources, the sur-harge has been proposed to help the government meet the additional cost of mporting crude oil following the Gulf crisis, which is estimated at Rs. 1,600 crores. It has been calculated that a hike in crude oil prices by $ one per barrel imposes an additional burden of Rs. 400 crores on the Indian government. Official sources say that the total burden will be Rs. 1,600 crores since the price has gone up by $ four per barrel, as far as India is concerned.

The government thinking is that the surcharge can be levied initially for a period of three-four months. It may be reviewed after this period. If considered necessary, the surcharge may either be extended or withdrawn.

The government objective is two fold. First, it is expected to create an awareness about the petroleum crisis faced by the country. The surcharge will send the message to the people that if they do not reduce petroleum consumption on their own, they would be forced to shell out more from their pockets.

The second objective is to ensure that there is no adverse impact of the Gulf crisis 'on the government's budget If the Gulf surcharge proposal tain to increase by another Rs. 1,600 crores. The government is in no mood to allow this. At the most, the government may allow the deficit to increase by Rs. 300-400 crores on account of the Gulf oil crisis. In that case, the surcharge would be reduced to the extent that it generates additional revenue of only Rs. 1,200-1,300 crores.

Official sources say once the Gulf surcharge issue is settled, the government would have overcome much of the crisis on the petroleum front. Adequate supplies of petroleum products have been tied up to meet the country's demand for the year. The Soviet Union and Malaysia have both agreed to supply more crude oil to India.

Officials, however, concede that the Gulf surcharge would fuel inflation. But the government's option is to whether to allow price rise by exceeding the budget deficit limit of Rs. 7,206 crores by another Rs. 1,600 crores or correcting the fiscal imbalance and settle for a limited impact of oil price increase on the price line.

The government appears to be favouring the surcharge route to distorting the fiscal balance.

CAREW REVISES VIZAG PROJECT

Carew and Co. Ltd., has submitted a revised proposal to the government in regard to its plan to set up at Vizag a Rs. 60-crore MMA/PMMA (methyl methacrylate/poly methyl methacrylate) project. The original proposal has been lying with the authorities for some time.

In the revised proposal, the company has indicated its desire to put up the PMMA project first with imported MMA. The production of MMA from isobutylene may be taken up at a later will be available from the Japanese.

The revised proposal became imperative in view of problems in getting the technology, Mr. Vijay Mallya, chairman of Carew told newsmen at Calcutta.

"We will go for the best technology available in the field involving production of MMA through the isobutylene route but the Japanese are reluctant to license the technology", Mr. Mallya observed. However, he was confident of getting the technology in due course.

The application for the Rs. 15-crore grain-based distillery proposed to be set up in Nainital district U.P. to manufacture five million litres of potable alcohol from coarse grains, potatoes and fruits was also pending with the government, he said.

Mr. Mallya pointed out that increasing excise barriers among states had rendered movement of alcohol from one state to another virtually impossible.

"We therefore prefer to offer to different smaller parties plant and equipment on lease, and in some cases even finance, to set up distilleries with buy-back arrangement". UB group's success in brewery has been largely due to its tie-up with as many as 17 distilleries throughout the country", he added. Earlier, while replying to shareholder's queries at the company's annual general meeting, Mr. Mallya pointed ou that there were no more plans to sell the Asansol distillery which, was now making profits. Instead, the distillery was being renovated and revamped.

The trading of manufacturing products had been abandoned as it wa found unremunerative. "The decisior has been by and large correct and th production, performance and sales o the company was up by 25 per cent i the first five months of the curren financial year, compared to the sam

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Thapar Nylon-66 proposal likely to be rejected

The Union Industry Minister, Mr. Ajit Singh, is understood to have disfavoured the grant of approval to the Thapar-Du Pont proposal to set up a project for the manufacture of Nylon-66, an industrial yarn used by the tyre units.

Mr. Singh, according to knowledgeable sources, has sought certain clarifications and has raised some basic questions while considering the 'reluctant' recommendations put forward by he special Projects Approval Board PAB).

Sources aver that as it is, the case is ather weak and failing satisfactory answers to the questions thrown up, the proposal is most likely to be rejected. The special PAB, on its part, while considering the project in early August was unanimous in its view that the proposal with a mere 42 per cent export commitment was not attractive enough as it would lead to a foreign exchange drain especially in view of the perpetual mport of raw materials.

However, the board noted that if Thapar-Du Pont could manage the necessary foreign exchange and rupee equirements on their own without ecourse to the country's financial instiutions, the Union Government would ave no objection to their setting up the project.

While the project authorities would e free to raise rupee resources from the apital market if necessary, foreign xchange outgo would have to be nil in iew of the precarious reserves position.

In effect, Thapar-Du Pont by impliation would also have to find the forign exchange to finance the perennial nports of adipic acid, the raw material sed for the manufacture of Nylon-66. vidently, this would be possible only rough matching exports each year.

In normal circumstances, the board would have rejected the proposal outright as with 42 per cent exports, the foreign exchange loss works out to Rs. 250 crores. However, owing to the sensitive nature that the project proposal has now assumed, the board has merely listed its views and has left it to the Minister to take a decision.

According to an official of a reputed foreign petrochemical journal, the project is certainly of particular interest in view of possible trends in the US to restrict trade and investment in India because of the so-called restrictive trading practices from the sub-continent. A clear hint to the threat of Super 301 and this project is being regarded as a test case.

It is, however, not yet clear whether the project proposal is to be finally decided at the level of the Industry Ministry or sent up to the Cabinet Committee on Economic Affairs (CCEA) for approval. The Ministry, it may be recalled, has been empowered to clear project proposals up to Rs. 200 crores. The Thapar-Du Pont project was earlier estimated to cost about Rs. 180 crores.

Following the controversy over the project for the past two years, the cost is believed to have escalated by about Rs. 60 crores taking the figure to Rs. 240 crores. Although Du Pont is not ready to reveal the exact costs, the foreign source quotes the US multinational having intimated $165 million (about Rs. 280 crores) which is nearer the mark.

Sources note that at the CCEA level, a decision on the project, if cleared by the Industry Minister finally, is going to be more political than economic. Be that as it may, for the present, Mr. Ajit Singh has raised doubts as to whether Du Pont would peg the price of the raw material, adipic acid, at the present level gradually increase it once the project passed, being the monopoly producer

Besides, of the 42 per cent expo commitment which includes the group' exports as a whole, the share of Nylon 66 may not be even 21-22 per cent.

To top it all, the Minister has questioned as to whether the project would at all be necessary as enough capacity to produce caprolactam, the raw material for Nylon-66, is being set up by domestic units so as to achieve self-sufficiency as far as the tyre units are concerned.

Even as Mr. Singh finds the right answers to his queries, industry watchers are curious about the extent of PAB's seemingly stiff conditions. The point being raised is whether the nil outgo of foreign exchange that has been imposed is for the Thapar group's exports as a whole or only for Nylon-66.

If it is the former, then the project authorities — driven to the wall —may still agree to set up the project as otherwise it would jeopardise Du Pont's grand design for nylon industrial yarn in South and East Asia.

CSIR PLAN FOR RURAL TECHNOLOGY

The Council of Scientific and Industrial Research (CSIR) has launched a campaign to finance and market technologies innovated in rural areas.

Briefing reporters at New Delhi, the CSIR additional-general, Dr. Ram K. Iyengar said the council would coordinate with semi-governmental agencies and voluntary organisations operating in rural areas around the country to identify and spread local technologies. The main problem according to CSIR analysis is marketing of rural techno-

L seeks naphtha supply at original level

ne Reliance Industries Limited .) has pleaded to the government to ore to their Patalganga petrochem- project the original supply of naph- nd other petrochemical products on grounds that it will save foreign ange worth Rs. 434 crores.

a letter addressed to the minister petroleum and chemicals, Mr. Gur- daswamy recently RIL has argued any cut in naphtha would increase foreign exchange outgo on value ed items produced with the help of htha. As a result of this the import ssential raw materials would suffer. pies of the letter have been sent to Prime Minister, Mr. V.P. Singh, the ustry minister, the finance minister a large number of government offi- ls.

The letter states that any cut in the ilability of naphtha would affect the duction of PTA, which would in turn versely affect the domestic supply of Y. The only way to satisfy the nand of PFY is to import. Accord- to the letter, the cut in PTA supply RIL would itself mean a foreign change drain of the above order. phtha is one of the key input in the duction of high value added products e paraxylene, PTA, PFY, PSF and en polyester fabrics. The government d cut down the supply of naphtha to petrochemical plants for this year by per cent of the last three-years aver- e take-off in June. The purpose was keep a check on the consumption of troleum products. The RIL letter, wever, argues that the cut in naphtha ould increase the foreign exchange tgo on value added items and the port of essential raw materials would ffer.

This does seem to be the case indeed, one were to go by the price of these oducts. The per tonne FOB price of phtha is Rs. 140 to Rs. 160. Whereas e per tonne price of paraxylene is Rs. 640, PSF Rs. 1,100 to Rs. 1,200 and PFY Rs. 1,850 to Rs. 1,950. That is the international price of the downstream products which is many times the price of naphtha, which means their imports are more expensive.

Also PFY is on the open general licence list, and therefore, there is no check on its import in the face of fall in the supply of this product which would be the obvious outcome of the cut in naphtha. The RIL letter claimed that their supply of paraxylene, PTA, PFY and PSF is more than their consumption and the balance is marketed.

The letter further stated that cut in the supply of naphtha would adversely affect PTA supply to the PSF industry, which is suffering from low capacity utilisation. The capacity utilisation in this industry will fall further. As a result a lot of money that is invested in this industry would be redundant. In this regard the letter also pointed out that RIL is increasing its PTA capacity to the minimum economic size of 200,000 tonnes production per annum so that they could supply more to the market. And therefore, the supply of naphtha should be increased for them.

PLEA AGAINST CUT IN NAPHTHA ALLOCATION

Two Maharashtra based companies have made a joint representation to the government against the 10 per cent cut on naphtha allocation as an austerity measure.

The two units — National Organic Chemical Industries Ltd. (NOCIL), and Rama Petrochemicals Ltd. — have told the government that the proposed cut is counterproductive because it will lead to fall in the production of naphtha-derived chemicals, which will necessitate further imports, involving foreign exchange outgo.

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World conference on human health and chemical accidents

In line with the recommendations of he World Conference on Chemical Accidents held in Rome, 7-10 July 1987, and the European Conference on Environment and Health held in Frankfurt, 7-8 December 1989, it was decided that it would be appropriate to organize a conference on chemical accidents, which will focus on the role of health professionals and other health authorities in preparation for, response to and prevention of chemical accidents. This conference, joinly organised by WHO Regional Office for Europe, OECD, UNEB and IPCS will be held from June 10-13, 1991 at Utrecht.

The following four main themes have been selected for participants to present their experience:

1. Health information and its communication: Health information needs to be available on a 24-hour basis and readily accessible in an emergency. This theme deals with communication of health risks to the public and how such information is generated and disseminated to those who need it, including the role of the poison information.
2. Organization aspects: This theme deals with the organization of health services to meet a chemical emergency; where various health services are available at national, district or local levels; which health professionals, such as clinical toxicologists, occupational physicians and first aid workers, need to be involved in planning for a response to such emergencies; and the organization of health follow-up after an accident.
3. Implementation: This theme deals with the techniques of implementing health protection and health response mechanisms and in the training of both health and emergency response personnel; it is concerned with how the various health professionals are term rehabilitation of victims of chemical accidents.
4. Research: This theme deals with health-related research in order to improve preparation for, response to and prevention of chemical accidents and their follow-up.

These four themes will be the subject of two parallel sessions, where participants present papers; the first four in the series directed towards the role of health professionals and health authorities in chemical accident prevention and preparedness; the second four directed towards the role of these health professionals and authorities in chemical accident response. Presentations on the other chemical accident health-related topics will be considered for poster sessions.

Submission of papers

Contributed papers will be welcome within the themes outlined and intending authors should submit an abstract of 200-300 words (Two copies) to the Secretariat as soon as possible for referring by the Committee. It should be ensured that name and full address for correspondence and title of conference appear on the abstract. The deadline for receipt of abstracts is 14 December 1990.

Proceedings

The Conference Proceedings containing all papers in summary will be published in advance and made available to delegates at the Conference. Manuscript preparation details will be sent to authors of accepted papers in February 1991 who will be required to submit by 2 April 1991 a manuscript in typed form for inclusion in the proceedings. The official language for this Conference is English.

Who should attend

The conference is intended for —government officials (local, state and (including civil defence experts —industrialists responsible for medic aspects of emergency preparednes —emergency medicine practitione and other medical personnel involved i accident response, — public health off cials, — worker representative —non-governmental organisations.

For further details contact: Worl Conference on Human Health an Chemical Accidents, Secretariat, CE Consultants Ltd., 26-28 Albany Stree Edinburgh EH1 3QH, UK.

ATASH INDUSTRIES

Atash Industries (India) Limited ha reported improved results for the yea ended March 31, 1990. The total incom has gone upto Rs. 50.40 crore fro Rs. 22.56 crores. After providing f interest Rs. 2.80 crores (Rs. 2.2 crores), depreciation Rs. 2.25 crore (Rs. 1.82 crores) and taxation Rs. 3 lakhs (Rs. 37 lakhs) the net profit work out to be Rs. 2.02 crores as compare to Rs. 2.12 crores, an increase of 23 on annualised basis. The production ammonium nitrate division has gone u to 10,320 tonnes (9145 tonnes) whi agro division has gone upto 79.42 mi lion bricks (55.43 million bricks) show ing an impressive growth of 60 per ce on an annualised basis.

The company's letter of intent to pr duce 10,000 tonnes per annum of emul sions is expected to be implemented i the current financial year and expected to significantly contribute the profitability of the company.

The company has been selected fro the private sector for packaging "Dhara" brand vegetable oil in manufacturing facilities at Noida (Utt Pradesh).

In view of the company's envisage long term investments, the directo have decided to conserve the company

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smuth and Glaxo's Zantac in ulcer war

laxo, the pharmaceuticals conglom- : behind Zantac, the world's best ng anti-ulcer drug, declares it is ncerned by medical findings which ear to show that bismuth — a cure l by the Victorians — is as effec- as Zantac and much cheaper, writes rge Parker Jervis.

ut Galxo, led by Sir Paul Girolami, onetheless developing a successor bining Zantac and Bismuth, which ld be available by 1995.

antac with sales of $ 1.2 billion for year to June 1989, accounts for rly half of Glaxo's business and has haps 40 per cent of the world's $ five ion ulcer treatment market. Bismuth a greyish-white metal used in alloys is the focus of research at the Ham- rsmith Hospital directed by Dr. John lam. A spokesman for Hamersmith tes: Our findings show that there is close correlation between duodenal ers and the presence of the bacteria icobactar pyroli. Bismuth sulphate in njunction with antibiotics kills the cteria, patients under test at Hammer- ith found that their ulcers healed. In ong running medical debate the role helicobacter is hotly disputed. Ana- st Ian White of Kleinwot Benson clares,“ I would ignore... it helico- cter certainly does not cause all ulcers d it is very debatable whether it is the use of any”.

Bismuth cures ulcers as well as ntac, but the former is a heavy metal hich could accumulate in the body and mage nerves. It provides slower pain lief than Zantac, Doctors have known out this for years and they continue prescribe Zantac. De-nol, a drug ased on colloidal bismuth sub-nitrate, as been on sale in the UK in various orms since the early seventies. Royal ist Brocades, its Dutch manufacturer, as licensed marketing rights to Procter nd Gamble in the US, although the US od and drug administration has not yet is not allowed to make claims for De-nol under ethical pharmaceutical rules, but analysts believe that the drug is steadily showing growing sales. Zantac still commands a leading position in the UK. Glaxo says there is little potential threat in De-nol. A spokeswoman states, “The issue of Helicobacter has been around for several years and has not been confirmed. We are looking at this in our research and development programme, but this should not be taken as confirmation that Glaxo belives there is relationship”.

Observer.

FOREIGN OUTFIT'S CLOSURE: CHLOROMYCETIN SHORTAGE FEARED

The decision of Boehringer Knoll and Parke Davis to close down their livo-nitro (L)-base plants in West Germnay and Spain respectively, for being uneconomical has created a shortage of this intermediate in the international markets.

L-base is used in the production of chloramphenicol, an anti-bacterial bulk drug that goes into the making of chloromycetin, a formulation prescribed for the treatment of typhoid. Indian manufacturers of chloramphenicol have necessarily to depend on imports of L-base, placed under OGL and attracting 100 per cent duty, as the Indian outfits of the two multinational companies —Boehringer Knoll, Parke Davis —use their entire output for captive consumption. Boehringer Knoll churns out 75 tonnes of L-base per annum, while Parke Davis produces 20 tonnes a year. The 20 to 25 producers of chloramphenicol, concentrated in the small-scale sector, between them import 150 to 200 tonnes per annum. Manufacturers of chloramphenicol say that L-base is becoming scarcer and scarcer in the international markets and they are unable to book orders from producers in Italy, China and Hungary, even at $ the shutdown of Boehringer Knoll's and Parke Davis plants. Result: imports of L-base have been reduced to a trickle and manufacturers fear that if this situation continues, there might be a shortage of chloromycetin. Consequently, prices of chloramphenicol in the domestic market have shot up to Rs. 16,000 a kg and are likely to go up still further. Incidentally, the price of chloramphenicol, which comes under category II (100 per cent mark-up) of the Drugs Prices Control Order (DPCO) 1987, has been pegged by the Centre at Rs. 1,130 per kg.

Over 100 chloromycetin formulators including Sarabhai, IDPL and HAL depend on the small-scale chloramphenicol producers for their supply. The main hitch in putting up a L-base plant in India, according to chloramphenicol producers, is the huge investment (capital outlay of about Rs. 20 crore) and poor returns due to price control. Parke Davis and Boehringer Knoll control the technology for the production of L-base.

IPCL PLAN

Indian Petrochemicals Corporation Ltd. (IPCL) has decided to undertake a massive wasteland development programme around proposed Gandhar petrochemical complex. The programme will cover 2000 hectares of barren and salt ingrossed land. Under the programme 2 million trees are to be planted and taken care for five years, after which the planatation would be handed over to tree growers cooperative societies. The total programme cost is Rs. 2.4 crores, of which IPCL will contribute Rs. 25 lakhs to a core fund and balance funding under various ongoing schemes. The petrochemical complex will also incorporate an elaborate environment and ecology management system to be set up at a cost of Rs. 25 crores. This will not only be to control effluent, air and noise qualities to international standards but also to incorporate studies and horticulture activi-

Roche allowed to import four life-saving formulations

The government has permitted Roche Products Ltd., to import four life-saving formulations manufactured by its parent company. The four formulations are madopar, mestinon, natulan and ancontil. Roche Products will market these life-saving drugs in India. While mestinon, natulan and ancotil have just been introduced in the country, company sources are hopeful of marketing madopar, a formulation used to treat Parkinsons' disease.

The company has already begun importing natulan, used for treating cancer of lymph glands, ancotil, used for curing fungal infection in the system, and mestinon, a formulation used for treating myesthenia gravis. While the company will import these formulations, it has been exporting dehydromethine dehydrochloride in bulk form to its parent company whose name has changed to Roche Holding Ltd. from F. Hoffmann-La Roche & Co. It has also been exporting to the USSR a drug intermediary, betaionone. Total exports, thus amounted to Rs. 11.32 crore during 1989/90.

The company spent Rs., 34.1 crore (Rs. 28.2 crore) in foreign exchange for import of raw materials, components and capital goods. Foreign exchange outgo on travel amounted to Rs. 8.90 lakh (Rs. 6.46 lakh). Dividend to non-resident shareholders claimed foreign exchange worth Rs. 4 crore (Rs. 3.73 crore). Meanwhile, the company's sales have gone up to Rs. 56.93 crores for the 15-month period ended March 31, 1990, up from Rs. 43.10 crore for the preceding 12-month period. However, the gross profit has slumped to Rs. 3.10 crore, down from Rs. 3.36 crore in the previous 12-month period. Mr. R.A. Shah, chairman of the company feels that, "unless there is a provision
automatic escalation clause, it wil
impossible to show adequate pro
Depreciation accounted for Rs.
crore (Rs. 8.7 crore). A provisio
Rs. 6.3 crore has been made for ta
tion (Rs. 9.3 crore). The net profit of
company stood at Rs. 6.2 crore, m
lower than the Rs. 15.6 crore in the
vious 12-month period.

NIRAJ PETROCHEM LURGI TIE-UP

Niraj Petrochemicals Ltd. has ente
into a technical collaboration with Lu
GmbH of West Germany for its
25.75 crore, 6000 TPA maleic an
dride project at Visakhapatnam,
Andhra Pradesh. Lurgi GmbH, a mar
leader in maleic anhydride technolo
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have been appointed as engineer
consultants for this project.

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CAPEXIL urged to set higher target

he Tamil Nadu Governor Mr. S.S. nala has chided the Chemical and ed Products Export Promotion uncil (CAPEXIL) for settling for an ort target of Rs. 570 crores in 0-91, considering that the nearly 400 crores would come in from the ort of granite and bulk minerals.

While the council's exports performce over the years has been encourag, the southern region's share was on ecline, Mr. Barnala said, while inaurating the annual conference of APEXIL, southern region, at Madras September 1. He was also of the inion that the target of Rs. 570 crores as not benefiting the size of the southn region.

Reminding the audience of the critl balance of payments position facing e country, Mr. Barnala stressed the eed to export more value added items. aking the case of granite industry, he aid that the exporters must gradually ut completely cease raw granite xports and concentrate on exporting inished, polished slabs.

The Tamil Nadu Governor also ulled up the industry for asking more nd more concessions from the Govrnment and said that more of the same "will not solve the problem". Exporters, on the other hand, must concentrate on making the best use of available esources.

Lamenting that even primary goods that are exported from India are not competitively priced, Mr. Barnala said that Indian exports will have to confrm to international quality standards and prices if they are to be successful in the global market.

Earlier, Mr. N.B. Patel, council chairman, welcomed the recent measures of the Government to boost and pointed out the importance back the country's efforts. A total and radical change in attitude toward Third World countries whose markets hold a lot of potential, is called for, Mr. Patel added.

The chairman of the council's southern region, Mr. S. Vedam, whose speech was read out in his absence, brought out the difficulties faced by council members. High on the agenda were the high cost of petroleum products like furnace oil, and the inordinate delay in delegating power to the customs department at the major ports so that they can issue rate letters. This, he said will greatly reduce loss of time in communication.

DRUG COMPANIES' DUES TO BE REALISED

The Minister for Petroleum and Chemicals, Mr. M.S. Gurupadaswamy assured the Lok Sabha on September 4 that the Government would take all steps to realise the arrears from the drug companies under the "drug price equalisation account', as early as possible.

Replying to a spate of supplementaries by Mr. Harshvardhan, he said roughly the arrears amounted to Rs. 176 crores from about 100 companies and if they did not respond to the Government's steps then "law will take its own course".

To a question by Mr. Nirmal Chatterjee if the Minister would seek an enquiry by the Comptroller and Auditor General of India into the huge difference in arrears computed by a committee and the department, Mr. Gurupadaswamy said first he would see what could be done by the department.

If it failed, then the help of other agencies could be thought of, he added. Members expressed concern over the ers were collected without any delay and with interest. The Minister said of the arrears of Rs. 176 crores only Rs. 14 crores had been paid by the companies.

The arrears fell in two categories and related to two different periods. One category related to the companies which went to the Supreme Court and the other category related to companies which had made unintended profits. "We are calculating the figures and they are tentative in nature. We have not got all the details", he added.

Mr. Gurupadaswamy said notices had been issued to these companies and only 30 had responded so far. In the written answer, Mr. Gurupadaswamy said five companies had tentative liability of more than Rs. 5 crores. They are: Cyanamid India, Hoechst India, Merind, Lyka Labs and Glaxo India. The exercise of determining the liability requires scrutiny of the records of the companies which are quite old. Meanwhile, the Government is working fast on these cases so that the issue of recovery is settled immediately and once and for all, he said.

ELECTRONICS FAIR

The Electronics Components Industries Association (ELCINA) is to be the largest participant in the electronics fair "Electronics India 90" to be held in New Delhi from September 5 to 11. A release from ELCINA said that some 70 of its members would be exhibiting goods made to international standards. Some foreign countries would also be attending the fair.

Simultaneously, several seminars will be held. ELCINA will hold one on 'Electronic components — strategy for export potential' on September 9. The Association of Electronic Industries in Singapore has expressed its keenness to sign a memorandum of understanding

Wockhardt to fund biotech research

Wockhardt Ltd., a Bombay-based harmaceutical firm, has signed an greement with the International Centre or Genetic Engineering and Biotechology (ICGEB) set up by the United ations Industrial Development Organsation (UNIDO).

According to the agreement, Wockardt will contribute up to Rs. 5 crores or research at ICGEB's New Delhi aboratory into insulin, tissue plasminogen activator, erythropoietin, hepatitis vaccine and another mutually agreed projects during the next five years.

Wockhardt will be responsible for downstream processing, manufacture and commercialisation of the research products. On behalf of ICGEB, UNIDO will receive royalties from sales in India and abroad.

India had reaffirmed its support to ICGEB in February in Vienna in an exchange of letters between Indian permanent representative Mr. Peter Sinai and UNIDO director-general Mr. Domingo Siazon. This extends the former agreement on the terms and conditions governing the ICGEB project.

According to the agreement, the New Delhi laboratory will focus on plant biology, immunology, molecular biology of hepatitis and malaria, design and synthesis of peptide antigens for disease resistance and synthesis of oligonucleotide probes used in DNA research.

ICGEB's other laboratory at Trieste will conduct research on regulation of DNA replication in human cells, molecular biology of the cancer causing Papilloma virus, protein structure and lignin biodegradation. The programme also aims at familiarising developing countries' scientists with genetic engineering and biotechnological techniques. Wockhardt has a research and development division with sophisticated analytical instruments. However the R & D significant contribution to biotechnology. The company has ben claiming discovery of "indigenous" processess in developing new drugs, and following them up with applications to the government to tie up with foreign companies for "technology upgradation". Indian companies are eligible for reliefs from price control on drugs produced through indigenous processes.

A certified claim of having developed a new route enables the company to get foreign exchange allocation for buying efficient technology abroad.

DRUG INDUSTRY PLEA TO LIFT CONTROL

Gujarat Chamber of Commerce and Industry has suggested to the Union Petroleum Minister, Mr. M.S. Gurupadaswamy to spare pharmaceutical industry and trade from the operation of government's arbitrary and rigid prices and profitability controls. This, accor ing to the Chamber, is absolutely essen tial as the fixation of cheap prices drugs without ensuring availability meaningless.

While advocating the need for expe ditious finalisation of price revisio applications so as to encourage inves ment and production, the Chambe stressed that remunerative prices b ensured to the producers so as to expan production of essential drugs, auto esca lation of 6% clause be introduced an to protect and promote the interests o the consumers, the taxes, duties an levies collected by Central, State an local Govts., be reduced from 40% t 20%. The Chamber further stressed tha if the crisis in the pharma business activ ity is not resolved at the earliest then th pharmaceutical industry and trade whic accounts for substantial production an distribution of drugs, large employmen and exports in the country, will be in th grave danger.

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DRUG ARREARS

Industry demands independent panel

The joint council of the pharmaceutical industry and trade has demanded the setting up of an independent committee to determine and decide the basis of calculation of arrears under the Drug Price Equalisation Account (DPEA). The committee should give the opportunity to the firms concerned to present their views before deciding the arrears.

Reacting to the Union petroleum and chemicals minister, Mr. M.S. Gurupadaswamy's statement in the Rajya Sabha on August 29th that about 100 drug companies owed the government Rs. 175 crore under DPCO 1979 Mr. Kishore Shah, chairman of the joint council, said, "if the unintended profit is viewed vis-a-vis the unintended loss caused by the delays in price approvals, it is the government which will have to pay hundereds of crores of rupees under DPEA to the industry".

Mr. Shah felt that government should seek the opinion of the law ministry to find out the 'vires' of the provision relating to DPEA. He pointed out that though the prices of packaging materials had gone up steeply since 1979, the government had been relying on obsolete costs of packaging material while fixing prices.

The reimbursement of legitimate cost increase in packaging material and conversion charges would alone amount to Rs. 100 crore, he claimed.

Mr. Shah further alleged that "the government has chosen only those periods where manufacturers have made gains arising out of their efficient buying ignoring those periods where they have incurred losses due to higher procurement costs of bulk drug and non-revision of the formulation prices".

He argued that whether the industry

tion of one particular product alone.

LUPIN GETS TWO MORE YEARS TO MAKE RIFAMPICIN FROM BASIC STAGE

The department of chemicals and petrochemicals has granted a two-year extension to Lupin Labs for production of rifampicin bulk drug from the basic stage. Rifampicin, an anti-TB and anti-leprosy drug, was shifted from category I to category II under the Drug Prices Control Order (DPCO) in 1988 following an assurance given by Lupin that it would produce the bulk drug from the basic stage by February 1990. Lupin, an organised sector unit, has been producing rifampicin from imported intermediates since January 1986. A few small-scale units also produce this drug from imported intermediates.

Under the phased manufacturing programme for rifampicin, the manufacturers are required to produce the bulk drug from the basic stage within two years of start of manufacturing operations with imported raw materials.

The department has, in fact, permitted some companies to continue production of bulk drugs from the penultimate stage based on imported raw material, 3-formyl rifamycin SV. Lupin is, however, producing the drug from intermediates stage using imported rifamycin S. Lupin is currently setting up a unit for production of rifamycin S intermediate.

SODIUM HYDRO SULPHITE TO COST MORE

The manufacturers of sodium hydro sulphite have decided to increase their prices by Rs. three per kg. from tomorrow, it is learnt. This is the second price rise of this chemical within a short period of five months.

was raised by Rs. two per kg. earlie during the current year. According t the trade circles, if the sodium hydr sulphite is imported, it attracts impo duty at the rate of 190 per cent and i landed cost works out over Rs. 48 a kg whereas indengenous goods are sold a present at Rs. 40 to Rs. 42 per kg according to their quality.

NO DIVERSIFICATION PLAN FOR BAYER

Bayer, AG, unlike Hoechst AG, ha no plans to introduce new technologie through its Indian subsidiary, Baye (India) Ltd. Mr. R. P. Goenka, Baye (India) chairman, attributes it to Baye being "a conservative company".

Mr. Goenka was replying to a share holder at the annual general meeting a Bombay, who asked why the compan did not diversify into new areas in add tion to expansion and modernisation o its existing activities. The shareholde said that in MDI/TDI, chemicals i which Bayer was a world leaders, other were stealing a march in India.

Bayer AG, it may be recalled, ha refused this technology to other India aspirants as well.

Replying to another query, M Goenka and Mr. C.M. Maniar, anothe director, claimed that Bayer (India) ha no relationship with Jagat Chemical the indenting agency for Bayer AG pro ducts in India. Being a FERA compan Bayer (India) cannot take up indentin business, he said. He claimed there wa not financial connection between th two companies.

On Bayer (India's) pharmaceutic business, Mr. Goenka said: "If the pro cess of liberalisation which had com menced following implementation o Drugs Prices Control Order 1987 is no halted, there is bound to be a shortag of bulk drugs and formulations, as com

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'Lok Shree' Award presented

r. Samir Manohar Surlaker, Manag- Director of MC-Bauchemie (India) ate Limited received the "Lok e" award from the Institute of Eco- ic Studies for outstanding services ciety at a function held in Bombay oincide with the all-India Confer- e on "Social Commitment Towards Society". M/s. MC-Bauchemie is leading manufacturer of freeflow shrink grants and non metallic con- e floor hardeners.

Mr. Samir Manohar Surlaker was born in Sanguem village in Goa. Both the parents were Hindi teachers. Mr. Surlaker passed the post graduation in Civil Engineering from Victoria Jubilee Tech. Institute, Bombay in 1976. He started his career with teaching in the same Institute. After a brief experience as Civil Engineer on site in India, Mr. Surlaker joined MC-Bauchemie, West Germany as Technical Trainee in 1977. Mr. Surlaker travelled all over Europe as well as Middle East countries and shortly became the Managing Director of MC-Bauchemie (India) Private Ltd. Mr. Surlaker attributes all the success to his education, training, exposure and the basic values instilled by his parents.

chnocrat Mr. Samir Surlaker (extreme left) receiving "Lok Shree" award from Lok Sabha eaker Rabi Ray and Maharashtra Speaker Madhukar Rao Chowdhary in Bombay as state using minister Javed Khan (extreme right) looks on.

People from several different fields were awarded "Lok Shree' for outstanding services to society. Mr. Surlaker represented the industrial field and the civil engineering profession and was awarded for promoting the concept of protection of concrete via many lectures, seminars and articles in the professional magazines.

While speaking at the function Rabi Ray called on the people to put their best efforts for collective advancement. In his presidential address Mr. Madhukar Rao Chowdhary pointed out that social commitment in essence meant working for the upliftment of the neglected class. Prof. Javed Khan reminded the debt that should be paid to the society in which we exist on a continuous basis and not just once.

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FACT fares better despite constraints

For the seventh year in succession, Fertilisers and Chemicals, Travancore Ltd. (FACT) had earned profits in 1989-90, in spite of severe loss of production due to power cut and non-availability of imported raw materials. The pre-tax profit for 1989-90 was Rs. 3.59 crores. The operating profit was Rs. 7.34 crores and the net profit after tax Rs. 3.01 crores.

Addressing the 43rd annual general meeting of the company held at Udyogamandal recently, Mr. S.M. Jain, acting Chairman and Managing Director, said but for the various external constraints such as power cut during the early months of the year and non-availability of imported phosphoric acid and ammonia for a considerable part of the year, the company would have achieved higher production and a higher profit.

The reduction in turnover due to these adverse factors was to the extent of about Rs. 80 crores.

The total production of nutrient nitrogen and P_2O_5 during the year was 1,98,332 tonnes and 1,09,078 tonnes respectively. This represented 76.5 per cent and 85.1 per cent of the target respectively.

Both the production divisions at Udyogmandal and Ambalamedu have improved their production performance in the first five months of the current year compared to the corresponding period last year.

In the Udyogamandal division, production of nutrient nitrogen went up from 14,615 tonnes to 20,305 tonnes (an increase of 38.8 per cent, the nutrient P_2O_5 improved from 6,663 tonnes to 9,827 tonnes, an increase of 47.4 per cent) this year. In Cochin division, the production of nutrient N and P_2O_5 were 95 per cent and 113 per cent higher
respectively than that during the cor
ponding period last year. In Coc
division, 93,763 tonnes of nutri
nitrogen and 43,390 tonnes of P
were produced during the first f
months of the current year.

The sales turnover during the y
1989-90 was 8.99 lakh tonnes valued
Rs. 350.29 crores. Product no
availability was the limiting factor
improving the sales performance.

Sales performance during the fi
five months of the current year h
shown a 45 per cent increase over t
sales during the corresponding peri
last year. While last year's sales for t
first five months was 3,47,051 tonn
it has gone up to 5,01,550 tonnes th
year.

FACT's engineering division, FED
commissioned and handed over a maj
project, viz., the twin stream pyrit
based sulphuric acid plant at Amjhor

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ihar for Pyrites, Phosphates and Che-icals Ltd., FEDO has since been ssisting this client in preparing a letailed project report for a similar pro-ect they are planning to set up at Sal-dipura.

Commissioning operations are under way in three major projects. These are 2 x 1000 tonnes per day sulphuric acid plant at Paradip being built for Paradip Phosphates Ltd., the in-house caprolactam complex at Udyogamandal and the captive power plant for the Cochin division at Ambalamedu. All are expected to go on stream shortly.

FCI, HFC UNITS REVIVAL TO COST Rs. 284.80 CRORES

An expenditure of about Rs. 284.80 crores is likely to be incurred for reviving the sick units of Fertiliser Corporation of India (FCI) and the Hindustan Fertilizer Corporation (HFC). Stating this in a written answer in the Lok Sabha on August 30, the Minister of State for Agriculture, Mr. Upendra Nath Verma said the accumulated losses of FCI and HFC, upto the end of March this year were Rs. 1,235 crores and Rs. 949 crores, respectively.

Mr. Verma said the sickness of FCI and HFC were mainly due to low capacity utilisation on account of power shortage, design deficiencies, old and obsolete technology, equipment breakdowns, poor work culture and surplus manpower, and also because the coal based technology was used for the first time in the case of FCI's plants at Ramagundam and Talcher. Mr. Verma said the question of shifting of headquarters at HFC was closely linked with its reorganisation and rehabilitation. No final decision had been taken in the matter.

MEDICAL TECHNOLOGY BASE URGED

The Minister of State for Science and Technology, Prof. M.G.K. Menon, has called upon scientists especially neuro scientists to chalk out a programme fo the creation of a modern medical tech nology base in the country. This way th various health problems can be tackle effectively.

Prof. Menon made these remark while addressing a seminar on biotech nological approaches to the area o neuro-sciences at New Delhi on Augus 31. More than 30 top neuro-scientist and experts from all over the country ar participating in the two-day session according to an official release.

The Minister pointed out that tremen dous advances are taking place in neuro logical molecular genetics and India scientists have the talent and ability t catch up with the latest developments i the world. Modern biology, biochemis try, cellular biology, neuro-sciences et are the areas that offer tremendous opp ortunities for research and developmen

TN TO GET GAS FOR POWER FROM CAUVERY BASIN

The Tamil Nadu chief secretar Mr. M.M. Rajendran, said the Cent had agreed in principle to allocate tw million cubic metres of natural gas fro the Cauvery basin for power generatic in the state. Inaugurating a workshop c "industrial opportunities in Tamil Nad for non-resident Indians (NRI)" org nised the State Industries Departmer he said the gas would be used for ge erating 600 mw of power. Since g sources were spread out all over t state, it would be advisable to go in f mobile power generating stations, suggsted.

NRIs have a high potential to inve in the energy, petroleum, coal and ele tronic sectors in the state and could co sider developing an integrated mini cum power generation complex at Ja amkondam in Tiruchirapalli district, added. He said as many as 56 proje

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NFL, IFFCO allowed to double capacity

The Union Government has allowed ational Fertilisers Ltd. (NFL) and ndian Farmers Fertilisers Co-operative td. (IFFCO) to double the capacity of heir plants at Bijaipur in Madhya Pralesh and Aonla in Uttar Pradesh, espectively and has also agreed to proide the required gas linkages through he Hazira-Bijaipur-Jagdishpur (HBJ) ipeline.

The permission to the two fertiliser ompanies for expansion has been given n the wake of the Government's deciion to give priority to the power sector n the supply of gas over the other secors, including fertilisers. In fact, the Government has rejected the industry's plea for setting up grassroot plants of the same capacity.

Further, it has been decided that the provision of gas to these units would be subject to the signing of a suitable contract with Gas Authority of India Limited (GAIL).

Official sources indicate that GAIL contract entails that in the case of the 'time limit' norm being flouted, the consumer would thereafter be deprived of gas supply which would then be provided to other sectors.

Recently GAIL had cancelled gas commitments to three fertiliser units along the HBJ pipeline — the Babrala plant of the Tatas, the Gadepan project belonging to the K.K. Birla group and the Shahjahanpur unit of Oswal.

Knowledgeable sources point out that this clarifies the Petroleum Department's stand that it will step down in favour of those consumers who continue to delay the commissioning of their plants and other operations for whatever reasons.

The department has also indicated that in the case of delay in the coming up of the downstream units, the development of gas fields by the ONGC would be delayed as "scaroe capital resources cannot be invested in projects where downstream utilisation ıas not been tied up".

According to sources in the Petroleum Department, a suggestion to double the capacity of the Indo-Gulf plant along the same pipeline had also been made. However, due to the capital crunch that it is presently facing, Indo-Gulf made no favourable response.

NFL, in this regard, has already submitted a techno-economic feasibility report to the Government. The capital cost of this project is estimated to be Rs. 645 crores with a foreign component of Rs. 204 crores. The project had an initial investment of Rs. 587 crore and an annual capacity of 334,00 tonnes of NPK. The commitment fo availability of gas for doubling IFFC plant's capacity to 668,000 tonnes o NPK had been given by the Petroleun Department on October 6 last year.

Sources point out that though the initial idea was to set up new units fo capacity addition, it was finally narrowed down to the doubling of capacities in order to reduce cost-overheads. According to sources in NFL, on the Bijaipur plant itself, there will be a saving of Rs. 150 crores in investment by setting up an expansion plant instead of a new unit.

It is also learnt that there would be considerable saving in subsidy to be paid to the Government on account of a lower capital investment of the project. Meanwhile, sources in the fertiliser industry point out that the Centre's lackadaisical approach towards additional capacity creation in the sector is causing concern. It is understood that no indication of further capacity creation in the Eighth Plan has come so far.

Industry circles assert that though no clear-cut decision has been made on whether the entire gas supply balance would be earmarked for the power sector, the policy being evolved is clearly in favour of the power sector.

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IIT sets up entrepreneurship park

"Be on step with the step towards osperity" — reads a slogan in the leaet brought out by the Indian Institute Technology, Kharagpur, the sponsorg institution for the Science and Techology Entrepreneurship Park (STEP). he entrepreneurship park, located on 52 hectare estate at Gopali, three ilometres south of the IIT, Kharagpur, a one-counter arrangement for turnng enterprising individuals into sucessful manufacturers of hi-tech roducts and processes.

A STEP official at Kharagpur said the roject's basic aim is generation of jobs nd wealth and spreading the culture nd skills of science and technology to ll sections of the society. The STEP vould act as a catalysing interace etween the sophisticated research aboratories of the sponsoring institutions and governmental and financial agencies on one side and the potentialf entrepreneurs on the other, he said.

The IIT, he said, is now building the nursery sheds with ample infrastructural facilities of water, electricity, communication and administrative work for the park. Eight entrepreneurs have already joined the STEP and have been provided with temporary sheds and offices, he said. The West Bengal chief minister, Jyoti Basu, while inaugurating the project, promised that the state and central governments would provide assistance to all young entrepreneurs who wish to set up small scale industries in the STEP.

Clarifying as to who would be eligible for joining the project, the STEP officials said anyone having a background in science and technology and possessing the drive and ambition, can join the park and translate his ideas and fulfill his ambitions by promoting new technologies. Established industrial houses, he said, are also welcome to try out new ideas on a pilot-project scale with all relevant expertise at STEP. The official also said if any entrepreneur wants to develop a new product or process at the STEP Kharagpur, he would get expertise and latest information from research groups at the IIT on the hi-tech field in which he could operate.

The IIT would also help the entrepreneur about the appropriate technology to be adopted by him and to give shape to his idea besides preparing an optimal project estimate. He said, the institute has sophisticated materials and processes, testing and characterisation of high precision measurements, instrumentation and control, computer (Cyber mainframe) plus 150 minis/micros besides a technical library. The IIT would also impart technical advice for preparing project proposals, feasibility reports, prototype design and proposals seeking financial assistance and loans from financial institutions.

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LEVER'S TECH. TO CONSERVE INDUSTRIAL OILS

Hindustan Lever Ltd. has successfully commercialised a highly intensive import substitution structurant technology that will lead to large-scale conservation of scarce industrial oils and foreign exchange, estimated at 3.5 lakh tonnes valued at Rs. 220 crores in the next five years.

This technology was developed by the research centre for the manufactur of toilet soap of the company. By virtue of the new technology, the average tota fatty matter (TFM) content in toile soaps would decline to about 53%, the company's Vice-President (Technical Mr. Gurdeep Singh, said at a nationa seminar on technology management.

The significance of the new technol ogy must be viewed in the light of th growing shortage of industrial oils. Th deficit in supplies, estimated at 1.5 lak tonnes in 1989-90, is likely to go up t about four lakh tonnes per annum b 2004-05, Mr. Singh said.

Sharp decline in industrial licences

The investment climate in the coun- y seems to have suffered a major set- ck in the first half of this year. The mber of industrial licences issued ring January to June slumped by 19.5 r cent. The letters of intent issued also ll by 15.4 per cent over that in the cor- sponding period last year.

The same trend was observed in the nancial assistance granted by the non- anking financial intermediaries. The ssistance granted by the financial insti- utions during April-July this year fell y about Rs. 650 crores or 19 per cent ver that in the corresponding period ast year. The fall was 19.9 per cent in he first three months.

The decline is more perceptible in the face of a high growth last year. The number of ILs issued increased by 16 per cent in 1989. The rate of growth in LoIs was 9.1 per cent. The financial assistance sanctioned by FIs grew by 11 per cent in fiscal 1989-90.

The fall in the industrial licences issued is even more alarming as it was expected that the number of ILs and LoIs issued will improve after the elections. Applications for ILs and LoIs always get accumulated during election time and are cleared soon after. Also, just before the elections very few ILs were issued.

The number of ILs issued during January to June this year was 198 against 236 in the same period last year. As many as 566 LoIs were issued in the first six months last year. The number fell to 479 in the first six months this year. The fall was equally significant for ILs and LoIs issued in the backward areas. Industrial licences slumped by 24 per cent and LoIs by 11 per cent during January-June this year against that in the corresponding period last year.

Interestingly, the total investment made last year through LoIs increased by more than 150 per cent over its level a year ago, according to the provisional estimates available. These estimates show that the total investment through LoIs was Rs. 19,796 crores in 1989 compared with Rs. 7,509 a year ago. The amount of investment for the first three months this year is not available.

This fall partly explains the financial assistance sanctioned by the FIs which fell from Rs. 4,072 crores during April-July 1989 to Rs. 3,426 crores in the same period this year. The fall was less perceptible as far as the amount disbursed is concerned. The disbursements fell from Rs. 2,552 crores in the first four months of the last financial year to Rs. 2,528 crores this year.

The poor investment climate reflects the business community's low confidence. Experts tend to link this with the volatile political environment. Although the fall in FIs' assistance is partly explained by the decline in ILs and LoIs issued, experts in the government consider this an indicator of breaking down of bureaucracy at the state level.

CHEMOX CHEMICAL INDS.

Chemox Chemical Industries Ltd. has declared excellent working results for the nine months (second half year of 1989-90) ended June 30, 1990 by achieving a turnover of Rs. 2,376.18 lakhs as against Rs. 1,618.22 lakhs during the eight months (second half year of 1988-89) ended March 31, 1989 of the previous period, recording an increase of 46.8 per cent.

The profit before depreciation and taxation has also shown a marked improvement from Rs. 35 lakhs to Rs. 84.82 lakhs recording an increase of 142 per cent over the previous period. The net profit has also improved substantially from Rs. 30.85 lakhs to Rs. 61.94 lakhs recording an increase of 100.8 per cent over the previous period.

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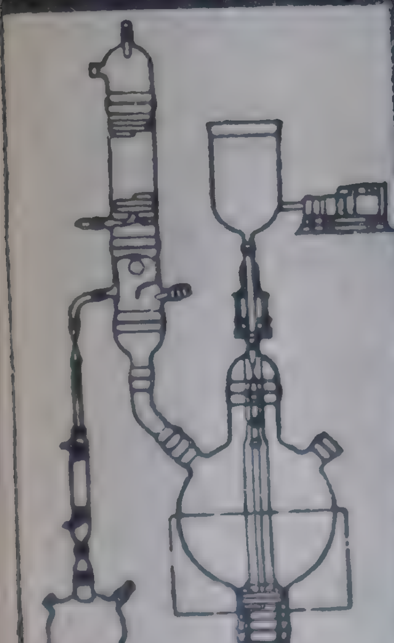

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1.16 LAKH TONNES EXTRA MOLASSES TO BE EXPORTED

Petroleum and Chemicals Minister Mr. M.S. Gurupadaswamy said that the production of molasses and alcohol during the year 1989-90 should be better than expected due to the record production of sugar this year. He informed members of the consultative committee attached to his ministry that the government had decided to permit further export of 1.16 lakh tonnes of molasses and 2,000 lakh litres of alcohol. Referring to the drug industry, the minister said there were long-pending issues such as recovery of over-charged amounts and recovery as a result of court cases. "We are moving fast on these issues so that they are settled once and for all", he said.

He said all other matters on which the industry, trade and consumers had been making representations to the government would be finalised during the review of the present policy. Mr. Gurupadaswamy said that the government had decided to set up an extension centre of the Central Institute of Plastic Engineering and Technology a Mysore in Karnataka. A suitable site fo this was being selected.

COPPER, LEAD PRICES HIKED

The Minerals and Metals Trading Corporation (MMTC) of India ha upwardly revised the selling prices o copper and lead for the month of September. According to a MMTC releas issued at New Delhi recently, the price of copper and lead were increased following appreciation in the Pound Sterling value. The corporation has raised th prices of electrolytic copper wire bar and continuous cast copper wire rods b Rs. 3,000 each at Rs. 88,500 an Rs. 94,000 per tonne respectively. Th prices of pig lead 99.97% and that o pig lead 99.99% were increased b Rs. 1,111 each at Rs. 36,000 an Rs. 36,200 per tonne respectively.

5 million tonne more crude soon

India is to get about five million onnes of additional crude oil from the USSR, Saudi Arabia, Iran and some other countries shortly, which will considerably ease the tight supplies position created by the Gulf crisis, the Petroleum and Chemicals Minister, Mr. M.S. Gurupadaswamy said at New Delhi on September 1.

He said that these additional supplies will make up for the entire shortfall of crude oil caused by the disruption of supplies from Iraq and Kuwait. Mr. Gurupadaswamy said some contracts were likely to be signed shortly with some of these countries particularly the USSR and Saudi Arabia, following very "positive signals" for an assured quantity of supply.

A high-level official delegation is already in the USSR and another in the Gulf, negotiating the quantum of supplies. India has signed a contract with Petronas in Malaysia for about 7.50 lakh tonnes. Indonesia has, however, declined to commit itself, but India is still trying to persuade. Brunei is also being tapped for supplies.

Mr. Gurupadaswamy said the Government would get some of these supplies as tied up term contracts and get the rest of the quantity through spot purchases. "But for all these we need foreign exchange and the reserves are limited as the country faces a very difficult balance of payments position," the Minister said.

It was difficult to quantify or determine the exact amount of foreign exchange that may be required for the imports of crude or petroleum products as the price is fluctuating, sometimes surging and sometimes dropping marginally, in the highly volatile international market, he said.

Although he declined to comment on his Ministry's request for release of exchange to meet the increased cost of imports following the upward trend in prices, Mr. Gurupadaswamy said both he and the Finance Minister were working hard on the matter.

Asked if the Government would consider relaxing the curbs on consumption if the supplies position improved, the Minister said it was a hypothetical question but indicated there would be no relaxation immediately as the tight foreign exchange situation was still there to cope with.

On the feedback of the impact of the austerity drive and conservation measures, Mr. Gurupadaswamy said, it was difficult to quantify the saving in petrol or in costs but there was a definite awareness among the people who had co-operated with the Government.

Mr. Gurupadaswamy said he had suggested at a meeting of the chairmen of the public sector oil companies tha a strategy be worked out wherein ever State is involved in montitoring th demand and supply position of petroleum products. The Government i committed to ensuring uninterrupte supply of petroleum products to all th States in the country, he said.

Rs. 70 CRORE OIL LOSSES

Oil production in the country ha declined by two lakh tonnes and anothe two lakh tonnes was lost in pumping accounting for losses of about Rs. 70 t Rs. 80 crores due to oil blockades an agitations, the Petroleum and Chemical Minister, Mr. M.S. Gurupadaswamy told the Rajya Sabha on September 3 A total of 359 foreign collaboration proposals were approved by the government from January to June this year, the Industry Minister Mr. Ajit Singh said In a written reply, he said they include 115 proposals involving foreign equity participation of Rs. 75.04 crores.

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Rs. 80 crores lost due to AASU oil blockade

The Petroleum Minister, Mr. M.S. urupadaswamy, told the Lok Sabha on ugust 29 that the situation on the etroleum front was going to be very rious. He hinted that some more ringent measures might become necssary to curb the consumption of oil.

However there was no cause for anic, he said. The Government had aken all steps to ensure that the distribtion system remained intact, the Miniser said in response to a calling attention otice tabled by Mr. Ajit Kumar Panja nd four others on the oil blockade by he All Assam Students' Union and the losure of the Barauni, Guwahati and Bongaigaon refineries.

The Minister said Assam had given he country a jolt when it was facing serous problems due to the Kuwait crisis which nobody had anticipated. The path being pursued by the activists of the AASU was suicidal since peace in the region was necessary for any investment. Mr. Gurupadaswamy said he was strongly opposed to creating hurdles to the exploitation of the natural resources of a region for national development. But at the same time, he said, while exploiting the natural resources of the State, care should be taken to ensure local development.

Mr. Gurupadaswamy said it was not correct to say that he and the Centre had done nothing to prevent the blockade. He had visited Assam and taken up the matter with the Chief Minister, Mr. Prafulla Kumar Mahanta, and the AASU.

Most of the ONGC installations in Assam had been closed due to the bandh. The agitators had not only been "threatening and manhandling" the ONGC personnel but also preventing them from working. They had been tampering with oil and gas wells also, he said.

The loss due the oil blockade was estimated at Rs. 80 crores, he said. Mr. Gurupadaswamy said the Government was making all efforts to import crude oil to meet the growing demand for petroleum products. Malaysia had already offered to help India and there was a positive response from the Soviet Union. Mr. Panja said the Government should have taken precautionary measures to prevent the blockade. Mr. Tej Narain Singh (CPI) alleged that the Government had adopted a soft attitude towards the agitators.

Mr. Ramashray Prasad Singh (CPI) said the tendency to prevent the oil sector from functioning should not be encouraged. Mr. Surya Narayan Singh (CPI) said the Barauni oil refinery was not functioning to its installed capacity of 3.3 million tonnes due to lack of crude supply. Prof. K.V. Thomas (Congress-I) also expressed concern over the closure of the oil refineries.

ONGC PROPOSALS FOR TRIPURA

The Oil and Natural Gas Commission (ONGC) proposes to tap six million cubic metres of gas per day in Tripura during the Eighth Plan. ONGC's Group General Manager, Mr. J. Swaroop, said at Agartala on August 29 that they were "keen" to see new projects come up in the State so that their "products can yield revenue".

He said prospective local entrepreneurs would be invited to a two-day workshop at Agartala on November 6 to provide them an opportunity to set up gas-based units in the State. ONGC was prepared to release three million cubic metres of gas per day. It proposed to lay a 20-inch pipeline to meet the requirements of prospective industrial units over the next ten years. Mr. Swaroop said Rukhta, Bormura and Agartala Dome could produce 5.5 million cubic metres of gas per day. He said he ha

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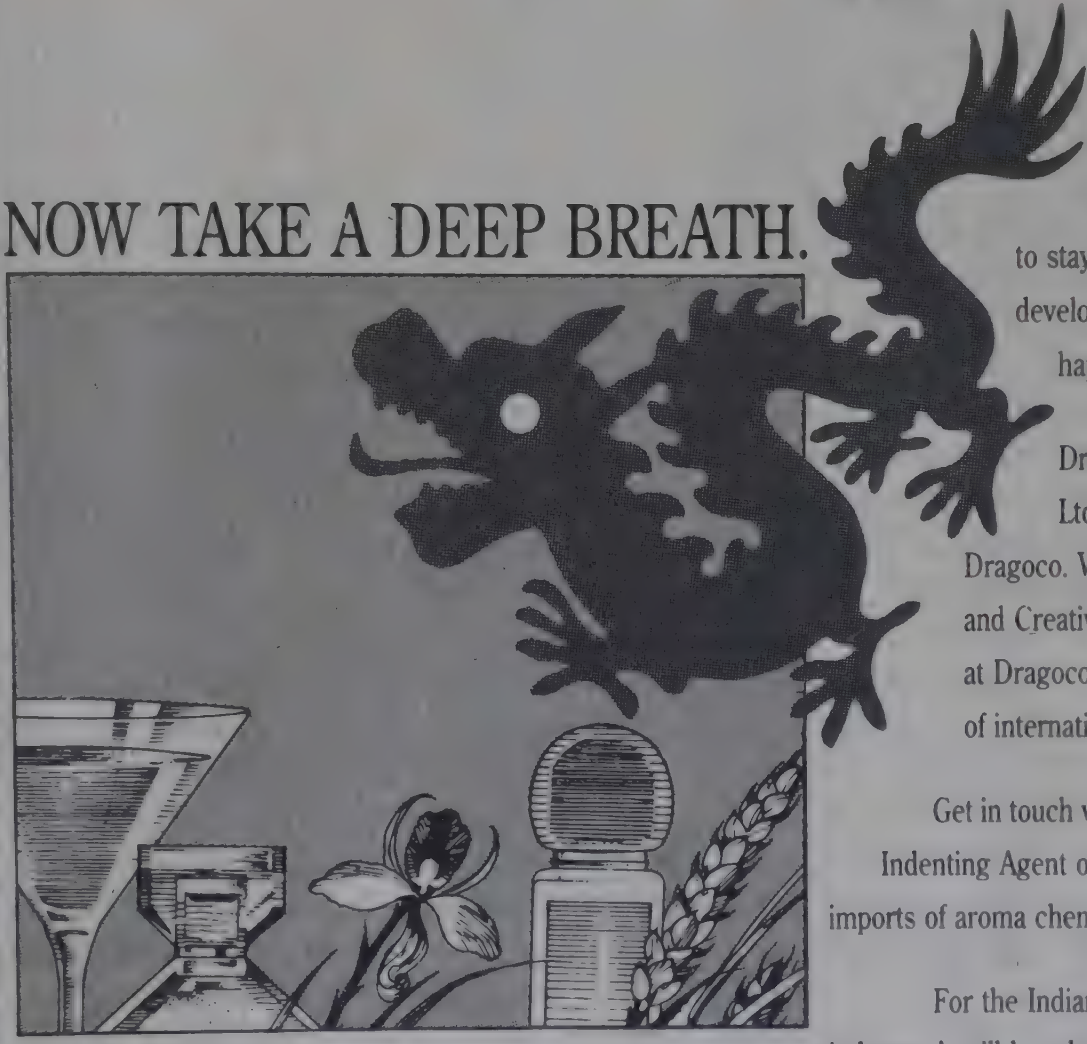

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More petroleum items may be taken off OGL

view of the current Gulf crisis, if government finds there were some oleum derivatives available adeely domestically, then it would conr transferring them from the open eral list to the restricted list, the nmerce minister, Mr. Arun Nehru, in the Rajya Sabha on Aug 30. Two hree weeks ago the government had ted some items accounting for 1,000 crore from OGL to restricted but it was done to cope with the difult balance of payments position.

Mr. Nehru expressed the hope that crisis in the Gulf would be resolved on, paving the way for resumption of lian exports to Iraq and Kuwait. ring 1989-90 the value of Indian ports to Iraq was Rs. 125.74 crore and Kuwait Rs. 197.88 crore. Total ports to West Asian countries amount Rs. 1744.93 crore in the year. The ajor items comprised engineering ods, chemicals, drugs, pharmaceutils, besides textiles, processed goods, a, spices etc.

Due to the UN Security Council resution imposing economic sanctions, exports to Iraq and Kuwait were king place at present. Exports to the vo countries constitute only 1.17 per ent of India's global exports, while tal exports to West Asia comes to 6 er cent of the country's total exports. e said, replying to supplementaries gainst a starred question in the Rajya abha, that even during April-June eriod the sales to the two countries registered a good increase, while sales uring the last two years registered a 94 ercent increase.

So, he said, the Gulf crisis should not ause undue alarm. Even though import f crude from these countries has sufered a setback, India was arranging for upply from alternative sources. He said ndia was monitoring the import of the

basis. But the fluctuation in prices is so erratic that it is difficult to quantify it in terms of an annual burden. Replying to another question, Mr. Nehru said that the government might consider bringing some petroleum derivatives on the restricted list, like it has done in respect of several items in order to effect a foreign exchange saving of Rs. 1000 crore. The finance minister, Mr. Madhu Dandavate, replying to a question told the House that a price increase by one dollar per barrel, would mean a burden of Rs. 400 crore on India's oil bill. He said the price had shot up from $16 per barrel to $29 a barrel.

THIRD WORLD AND A THIRD OIL SHOCK

The annexation of Kuwait by Saddam Hussein's regime and the ensuring imposition, by a UN Security Council decision, of economic sanctions against Iraq have actually taken away from the world market 8 of consumed oil reserves (4m barrels a day). This immediately affected its prices. Having jumped to 28-30 dollars a barrel, they have then somewhat dropped, constituting $26-27 a barrel, which exceeds by 20 their level at the beginning of the year and by more than 40 the June quotations.

The consequences of this have already had impact on many economies, affecting the interests of the broadest sections of the population. In many developing states a rise in retail petrol prices has occurred (in Argentina by 20, Brazil by almost 10). The world is now full of anxiety. The well-being of hundreds of millions of people depends on how events will develop in the Gulf and how long the anti-Iraqi economic sanctions will remain in force.

Having annexed Kuwait, Iraq at present controls 20 of the world's

Hussein subject Saudi Arabia too (although this is unlikely because of the resistance of so many states), he would have 45 of these reserves, dominating the Middle East and manipulating world oil prices at will. No sanctions would then be effective enough. In this most pessimistic scenario, experts predict soaring oil prices of up to $100 a barrel, which would trigger a new world economic crisis. Even if the Iraq-Kuwait conflict does not further develop, but merely draws out, its impact on the world economy will be extremely negative.

Most of the Third World countries will be worst hit. They 'll see much dearer imports, reduced imports of essential goods of the non-oil group (machinery and equipment, technologies, food), a further shrinkage of the already meagre gold and foreign exchange reserves, an impaired balance of payments, and graver debts. Inflation will spiral on. Thus, in the Philippines its Gulf-related growth is being forecasted at 17-19 by the end of the year, compared with the current rate of 12.5. As a result, economic growth will slow down, living standards decline and internal political instabil increase. The West, having oil stocks of 142m tons (enough to maintain the present rate of consumption without resorting to outside purchases within 150 days), will be able temporarily to make up for losses. However the oil shock, if protracted, won't spare the oil-imporing developed countries either. Inflation is bound to grow, and the incipient economic recession will further deepen.

IRAN TO MAKE UP LOSS IN OIL SUPPLIES TO INDIA

Iran will boost oil exports to India to compensate for the loss of oil from Iraq and Kuwait. According to an agency report monitored in Nicosia, Iran, Saudi Arabia, the Soviet Union, Malaysia and a number of other countries had agreed to boost their oil exports to India by a

IOC Kandla-Bhatinda pipeline plan okayed

Mr. M.S. Gurupadaswamy, Union Minister of Petroleum and Chemicals, has said that the Government has approved the proposal of the Indian Oil Corporation for laying a 1330 km long pipeline from Kandla (in Gujarat) to Bhatinda (in Punjab) at an estimated cost of Rs. 917.55 crores including a foreign exchange component of Rs. 204.54 crores.

The Minister, who was addressing the consultative committee of Members of Parliament attached to his Ministry said that the pipeline will traverse Gujarat, Rajasthan, Haryana and Punjab with a branch pipeline from Kota to Jodhpur (123 km).

The proposed pipeline, the Minister said will enable uninterrupted supply of petroleum products to the north-west and Koyali-Kandla-Okha regions (comprising Jammu and Kashmir, Punjab, Haryana, Himachal Pradesh, Delhi, Western Uttar Pradesh, Rajasthan, Madhya Pradesh and Gujarat) to meet the growing demand.

The project will be completed by May, 1993, he added. He also informed the members that a ministerial committee had been appointed to examine the feasibility of a southern gas grid. The matter will be examined after getting the report of the committee.

Speaking about the project for setting up of a petro-chemicals refinery at Managalore which has been pending for some time, Mr. Gurupadaswamy said that a revised proposal for the setting up of three mtpa refinery (excluding the naphtha cracker) by the Hindustan Petroleum Corporation and Indian Rayon, in the joint sector has been submitted recently for the consideration of PIB. The cost of the project proposal is estimated at Rs. 1100 crores with a foreign exchange component of Rs. 278 crores. The Minister informed the members that ONGC's project for the development of the Neelam field in the western offshore had been approved by PIB and will be now placed before the Cabinet for approval.

This project, which will cost approximately Rs. 2,000 crores, is expected to add 63.19 million tonnes of oil and 8.558 billion cubic metres of gas over a period of 21 years.

The plateau rate of production of crude oil will be four million tonnes of oil per annum for the initial period of six years.

"The Heera-Uran 24" trunkline was commissioned recently. Approximately, 45,000 barrels of crude from Heera, R-12 and Neelam fields is being received at Uran. This has also resulted in additional LPG production at Uran due to recovery of more hydrocarbon vapours through lean gas stripping in the crude stabilisation unit.

The oil processing system of Heera complex, Mr. Gurupadaswamy said has also been commissioned, thereby increasing utilisation of 1.5 million cubic metres per day of natural gas and correspondingly reducing the flaring of gas.

The commissioning of Heera-Uran gas trunkline was completed early this month. The Government has also approved the proposal of the Madras Refineries Ltd., for the expansion of its lube plant at an estimated cost of Rs. 163.75 crores including a foreign exchange component of Rs. 12.81 crores.

With this expansion, the production of lubes will increase from 1,40,000 tonnes to 2,70,000 tonnes per annum. Increased production will help in reducing the deficit of lube oil base stock and thereby saving foreign exchange. The project is expected to be completed by May, 1993. The Minister informed the members about several other important projects which are also due to be considered by PIB shortly. These includ the project for the development of th Mukta field in the western offshor which would cost about Rs. 1,23 crores, the Tatipaka-Kakinada gas pipeline project, and the project for distribution of natural gas to the domestic commercial and selected industrial consumers in Greater Bombay.

The project to control the flaring of gas in the western offshore region which is a priority project, is already under PIB's consideration, he said. He also expessed serious concern over the disconcerting developments which had taken place in Assam recently and also over the recent developments in Wes Asia which have affected the supplies of crude oil and petroleum products from Iraq, Kuwait and the USSR.

These have led to increase in the prices of crude oil as well as petroleum products in the international market. About chemicals, the Minister said that in the wake of a record production of sugar this year, production of molasses and alcohol during the alcohol year 1989-90 should be better than expected.

The Government, he said has decided to permit further exports of 1.16 lakh tonnes of molasses and 2,000 lakh litres of alcohol.

GAS FRACTIONATION PLANT AT URAN COMMISSIONED

Oil and Natural Gas Commission (ONGC) has commissioned the gas fractionation plant at Uran near Bombay which is to provide C2, C3 gas fractions and feedstock for Maharashtra gas cracker complex (MGCC) of Indian Petrochemicals Corporation Ltd. (IPCL).

Based on the feedstock from the Uran plant, IPCL will start manufacture of low density polyethylene by September-end. Production of mono-ethylene glycol (MEG) will start two weeks later. Commercial production of LDPE will begin in October

NGC to commercialise new technologies

a major policy decision, Oil and ral Gas Commission (ONGC) has ded to commercialise technology eloped at its R and D institutes. The mission has entered into agreements ten entrepreneurs for transfer of nological knowhow of the patents eloped by it.

he commission has streamlined its tract management procedures so as ncorporate a clause on royalty payt to ONGC. This initiative by GC besides helping in the growth of indigenous chemical industry would add to its commercial income.

According to official sources, the hnology sharing arrangement with various firms is carried out in three ges. In the first stage, technology for oviding lab-scale knowhow is proled free of cost with complete techcal and other details. Based on the ccessful completion, a pilot project is ablished to test the applicability in the ld. Only after passing stringent qual control tests is the pilot cleared for ll-scale commercial establishment.

The ONGC's Institute of Drilling echnology (IDT) has so far developed chemicals through its own efforts. ut of these, while patents have been otained for five chemicals, ONGC has oplied for obtaining patents for the rest.

The chemicals, which have been eveloped by the R and D institute, nclude mud chemicals like ferrohromo lingo sulphate (FCLS) and sinex (Idex), cement additives like turulence inducers, filtration lost controling agent (OFL-1) and low temperature etarder (IDR-100), oil base mud clay Organo-phillic clay), E.P. lubricants, welling transducer and thread dope ompound amonst others.

Each of these chemicals is being mported presently. The total potential

Plan. More specifically, the annual requirement for the five mud additives developed by the institute is estimated to be Rs. 18 crores. The projected demand of FCLS and Idex during 1990-91 is expected to be Rs. 6 crores.

Besides development of indigenous knowhow for these chemicals, the Institute of Drilling Technology has introduced innovations for substitution of diesel, adoption and implementation of various advanced technologies such as measurement of oil drilling, use of polycrystalline compact bits and horizontal drilling.

It has been estimated that the various studies at IDT have effected savings to the extent of 50 per cent of time and money in many cases by optimising the various drilling parameters. This holds the potential of saving Rs. 5 crores annually on account of the diesel consumption by ONGC.

A new chemical — Lom Thermogel — is also under field testing. The division has also fabricated various instruments such as shale swelling transducer for testing, low specific gravity foam design apparatus and bridging material apparatus for use in the field.

Besides drilling fluid and additive process knowhow, IDT has identified a number of cost effective and indigenously available chemicals for use in ONGC drilling operations e.g., lignite and its various derivatives, linseed oil to name a few during the last year alone.

The Drilling Fluid Engineering Division of the institute has successfully substiuted the use of diesel in drilling fluids with the cheaper and environmentally safe linseed oil.

CABINET PANEL REVIEWS OIL SUPPLY PROBLEMS

The Cabinet Committee on oil man-

Natural Gas Minister, Mr. M.S. Gurupadaswamy, the Finance Minister, Mr. Madhu Dandavate, the External Affairs Minister, Mr. I.K. Gujral and the Commerce Minister, Mr. Arun Nehru, met at Delhi on Aug 29, to review the steps taken to meet the disruption in the supply of crude and petroleum products from Kuwait, Iraq and the USSR.

While the Government has arranged additional supplies of crude from Iran, Saudi Arabia, Malaysia and Indonesia to meet the situation, an official delegation left for the United Arab Emirates and Bahrain for tying up supplies of crude and petroleum products. These are besides the additional supplies arranged from Iraq and Saudi Arabi through spot purchases.

The Government has already tied up with Malaysia for importing 0.5 million tonnes of crude. A delegation has been sent to the USSR for ensuring uninterrupted supplies from there. Official sources said these efforts would help not only in ensuring a steady flow of crude and petroleum products but also in building satisfactory inventory holdings.

HOEC TO SPREAD TO LAND OIL DRILLING

Hindustan Oil Exploration Company (HOEC) has decided to go in for land drilling functions and getting key seismic data for acquistion and exploration in the oil exploration areas. For this they have decided to invest upto Rs. 10 lakhs in Hindage Oilfield Private Limited.

This was announced by HOEC managing director Ajit C. Kapadia to the shareholders at the company's annual general meeting (AGM) at Bombay on August 31. The AGM was presided over by HOEC chairman B.K. Nehru. Earlier, in his speech he stressed that 'political taboo'' of exclusivity of exploration in public sector should be removed. The private sector too should be allowed to participate in oil explo-

unds crunch affects work on Haldia Petro

The Haldia Petrochemicals' project is ing a funds shortage for its prelim- ary infrastructure development even ough Dr. Asim Dasgupta, West engal finance minister, said that s. 100 crore had been allocated by the ate government for the current finan- al year.

At a meeting held after the revised tter of intent was received by the state overnment, the HPL managing direc- r, Mr. S.N. Bhattahcharrya, warned ecretaries and other officials of cost verruns if the project was delayed at is early stage.

The meeting, held on August 22 in e chamber of the chief secretary, Mr. .C. Dutt, who is also the chairman of e HPL board of directors, was called o discuss the present status of the Rs. 3,000 crore joint venture.

The meeting discussed the progress of work on infrastructural facilities in Haldia. The IDBI chairman, Mr. S.S. Nadkarni, had indicated that the WBIDC and Tata Tea will have to have 50 per cent of their contribution ready before mobilisation of resources from FIs.

At earlier press briefings, Mr. Dasgupta, had repeatedly said that work on infrastructure was progressing at a fast pace. This was reiteriated at the meeting by the chief executive officer of the Haldia Development Authority (HDA) who said work on building of roads, afforestation, construction of buildings and planning of a four-kilometre-long storage pipeline was 'nearly complete'. But Mr. Bhattacharrya expressed his dissatisfaction at the progress of work and said that this was probably due to paucity of funds.

According to the review of the Industrial Scene in West Bengal published by the commerce and industries department, about 1005 acres at Haldia have

about 811 acres were acquired and delivered to the West Bengal Industrial Development Corporation (WBIDC). Mr Bhattacharrya however, has asked the government to acquire and transfer more land.

Mr. Bhattacharrya emphasized, the need to acquire more land for afforestation. He said a buffer zone had to be created and 93.8 acres adjoining the HPL office had to be afforested. Following Mr. Bhattacharrya's views, the meeting decided to form a team to expedite the work.

The team will comprise representatives of HPL, Haldia Development Authority Haldia Notified Areas Authority (HNAA), the parks and gardens wing of the forests department, the commerce and industries department and the additional district magistrate Tamluk. The meeting also decided that the managing director of WBIDC would constitute a committee to plan the 4-km storage pipeline. According to the status report for HPL, naphtha will be brought by ship to the Haldia dock from where it will be pumped to the cracker (mother plant) four kilometers away. The committee will comprise representatives of HPL, HDA, etc.

It was also decided to chalk out a plan to resettle the local population who may be displaced because of the project.

SAUDIS RAISE OIL OUTPUT

Saudi Arabia has increased oil production by 2.27 million barrels a day and will give priority to supplying developing nations hit hardest by the embargo on Iraqi and Kuwaiti oil, officials said. The increased production is designed to make up for the shortfall created by the UN embargo on products from Kuwait and Iraq according to Saudi and western officials, who spoke on condition of anonymity.

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Gas panel to ensure optimum use mooted

The Union Ministry for Petroleum nd Natural Gas has suggested that a gas linkage committee' should be set p to clear gas allocation and periodi-ally review the progress made by both pstream and downstream projects as a art of the strategy to reduce flaring of gas and ensure its optimum utilisation.

The high-level committee is proposed o be set up under the chairmanship of Secretary, Petroleum and Natural Gas, with members from the Planning Commission, Finance Ministry and the concerned administrative ministries.

The 'gas linkage committee' would, subject to availability of investment, make allocations for the entire quantity of gas available in the country. However, the committee will not deal with petty consumers having small requirements.

The Ministry has recommended that Gas Authority of India Ltd. (GAIL) should be permitted to make allocations of gas in such cases subject to the conditions that (a) allocation in any region will not exceed 10 per cent of the projected gas availability, (b) such allocations will be on stand-by, interruptible or fall-back basis, and (c) allocation in each case will not exceed 0.5 million cubic meters per day. In other words, only projects requiring a firm linkage and fall-back or interruptible linkage in excess of 0.5 million cubic metres would need to come to the 'gas linkage committee'.

Needless to say, GAIL would abide by such policy guidelines as may be given by the Government from time to time in making these allocations.

Apart from clearing gas allocations and reviewing the progress of up-stream and downstream projects, the committee would also take appropriate action in respect of projects that are not meeting the targets set for them. The proposal was made in view of the fact that gas use in the country is expected to increase from the current level of 27 million cubic metres per day to 98 by 1994-95 (33 million tonnes of oil equivalent (TOE) per annum) and reach 122 million cubic metres per day (41 million TOE) by 2000.

About 17 million cubic metres per day of gas is now being flared of which about 14 million cubic metres per day is flared in Western offshore, 1.50 million cubic metres per day in Assam and 1.5 million cubic metres per day on the Western onshore. The economic value of gas so flared has been estimated to be about Rs. 1800 crores a year.

It is also felt that special attention would have to be focused on research and development on gas projects such as extraction of middle distillates from natural gas, cost reduction in gas transportation and feasibility of floating barge-mounted units offshore. The switch-over to compressed natural gas (CNG) as an alternative to the liquid hydrocarbons in the transportation sector also offers great potential in reducing our dependence on oil.

Gas grid in South

The Petroleum and Chemicals Minister, Mr. M.S. Gurupadaswamy, said a ministerial committee had been appointed to examine the feasibility of the southern gas grid.

Addressing a meeting of the consultative committee attached to his ministgry, Mr. Gurupadaswamy said the matter would be examined after the committee submitted its report. Regarding the setting up of a petrochemicals refinery at Mangalore, Mr. Gurupadaswamy said a revised proposal for setting up a refinery, excluding the naphtha cracker project by Hindustan Petroleum Corporation and Indian Rayon, a joint sector venture, had been submitted recently for consideration by the Public

was estimated to cost Rs. 1,100 crore with a foreign component of Rs. 27 crores, he added.

MINI OIL REFINERY SOUGHT FOR AP

Kusum Krishna Murthy, MP, ha demanded establishment of a mini o refinery in Amalapuram island i Andhra Pradesh where oil has bee struck.

Of the 24 wells drilled there, oil wa struck in eight wells and it was foun economically viable, he told reporter at New Delhi. The oil potentiality wa found to be very high compred to th existing potentialities found in othe areas like West Godavari and Krishn districts of Andhra Pradesh, he said.

However, the government wa making efforts to take the gas fron Amalapuram division through pipelin to Kakinada for fertiliser plants, powe plants and other industries to be set u there, totally ignoring the local interest of the people of this island, he said. Th state government had sent specific project reports for two gas-based powe projects in this division, he added. N industrial venture had been set up so fa in this island inhabited by 1.2 millior people. If the government ignored th demand of the people and tried to transport the gas elsewhere, it would hav serious consequences, he said.

AGARTALA TO GET PIPED GAS

The Oil and Natural Gas Commissio (ONGC) signed an agreement recentl with the Tripura Natural Gas Compan (TNGC) for starting household suppl of piped gas from September 15.

According to the agreement, ONGC would supply the natural gas for distribution in the households in this capita town in a phased manner. Under th Rs. 14 crores project each househol would get a supply of unlimited suppl

Assocham urges govt. to continue oil imports

The Associated Chamber of Comerce and Industry of India (Assocham) esident Mr. Avijit Mazumdar, urged e government to continue imports of troleum products instead of resorting "cutbacks" in the interests of the anufacturing sector and exports.

Mr. Mazumdar expressed fears that e country might go in for more import ontrols, not only on petroleum products ut also on other items in view of the cent developments in the Middle East nd hardening of oil prices.

This would in turn affect the manfacturing output and exports as any eduction in input will lead ultimately o four or five times reduction in the alue of goods not produced, he said while addressing a press conference in Bombay at the Indian Merchants' Chamber (IMC).

Mr. Mazumdar pointed out that before the crisis in the Gulf, the government had announced a 10 per cent cut in fuel and petroleum feedstock. But the industry did not agree to it since it would adversely affect the manufacturing output. The fear over import controls also stemmed from the fact that the balance of payments situation continued to be "grim" despite improved export performance. Exports increased from Rs. 20.295 crore in 1988-89 to Rs. 27.681 crore in 1989-90.

Over the same period, imports went up from Rs. 28.195 crore to Rs. 35.412 crore in 1989-90. The Assocham president, however, welcomed the government's initiative in tapping supplies of oil from alternative sources to tide over the difficulty and hoped that imports necessary for the country's industrial growth will not be curtailed.

Mr. Mazumdar said it was high time that India moved away from the "com- the free market economy, and in this context asked why there should be any threshold to the size of MRTP companies at Rs. 100 crore now when India wanted to be part of global economy.

Allowing foreign investments on the other hand would help bolster the falling value of the rupe besides enabling the development of five lakh villages in the country with the necessary infrastructure instead of merely confining development to the five metros, he observed. He also favoured "flexibility" among the partners to decide on enlarging foreign equity participation even up to 60 per cent.

Foreign investments would work out cheap than the borrowing heavily resorted to by the country, he added. The apex advisory council of Assocham which met at Bombay earlier attacked the new industrial policy which restricted foreign equity participation to 40 per cent. With the prevalent debt-equity ratio, foreign investment came to Rs. 4.5 crore in non-backward areas, and Rs. 14 crores in backward areas which was too small to interest any large sized foreign company much less any multinational. Such amounts would attract only small and medium-sized units from countries like Japan, the UK and Europe. Moreover, the industrial policy was just confined to the development of agro-based industries and the small-scale sector, he said. The Assocham president, however, said that for meeting the demands of the consumers for quality products, the organised sector should have a symbiotic relationship with the small sector so as to have the latter manufacture components of good quality with the use of quality controls and R and D from the organised sector. Investment in the small-scale sector also meant more employment generation he said.

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Rubber industry to get high priortiy

The rubber goods industry in India is a stratgeic one and has made rapid stride during the last 25 years. The turnover has crossed Rs. 4,000 crore with an export of Rs. 100 crore annually.

Although the present annual growth is approximately, eight per cent, the per capita consumption is 0.6 kg against 12-13 kg in developed countries. Thus there is considerable scope for the growth of the rubber industry. Out of about 5,000 units manufacturing rubber goods, majority are in the small scale sector. This sector accounts for about 30 per cent of raw rubber consumption, producing a wide range of products such as bicycle tyres and tubes, footware etc.

This industry, however, is facing some problems. If suffers from shortage of raw material (natural rubber) at reasonable prices, problem of availability of synthetic rubber and certain rubber additives. Mr. Srikant Jena, Union minister of state, departments of small scale, agro and rural industries has called upon the rubber industry to come out with concrete suggestions for increasing the use of synthetic rubber in certain identified areas. With this, the ratio of consumption of natural rubber and synthetic rubber is expected to shift towards synthetic rubber, as is the international trend.

The minister has suggested that the non-tyre sector should start contributing more to the export earnings. The industry, Mr. Jena feels, should come out with specific proposals for maximising export earnings, in the non-tyre sector, which is mainly in the small scale. To make the goods acceptable in the international market, the minister has stressed the need for R&D as also quality control.

Mr. Jena, who was speaking at Bombay at a seminar on "Modern trends and growth opportunities in rubber industry", pointed out that the Central Investment Subsidy Scheme for the small scale sector in rural and backward areas. This scheme is capable of generating higher level of employment at lower capital cost, which is relevant to the rubber goods industry.

The minister has said that the developments in the automotive sector in India will lead to an accelerated pace of utilisation of rubber products. It is therefore, necessary that the resources with regard to manpower, machinery, materials and markets are consolidated so that the country can develop an industry which is considered the most advanced in the world.

Mr. R.K. Raman, president, AIRIA stressed the need for modernisation, upgradation of technology and quality consciousness. He stressed upon enhancement of CCS and drawback rates as well as rubber subsidy to step up exports.

RUBBER GROWERS WANT HIGHER FLOOR PRICES

A 40-member delegation of representatives of small rubber growers in Kerala is to meet the Prime Minister, Mr. V.P. Singh, in New Delhi to request that the present floor price of rubber at Rs. 17.85 a kg. fixed three years ago, be raised to at least Rs. 24. The delegation will be led by Mr. P.S. John, president of the Kerala State Cooperative Rubber Marketing Federation. A Rubber Marketing Federation spokesman said at Bombay that the delegation was also likely to meet the Union commerce minister, Mr. Arun Nehru, and the minister of state for commerce, Mr. Arangil Sreedharan in this regard.

According to federation sources, rubber prices which were ruling between Rs. 22 and Rs. 25 a kg., in June, and July and August last year had crashed to between Rs. 17.65 recently,

Rubber cultivation had become qu uneconomical for small grow who accounted for nearly 80 per c of the annual production of 2.70 la tonnes. Kerala accounts for 90 per c of the country's total production. Duri 1989-90, the country's total rubber p duction amounted to 2.70 lakh tonn as against a demand of three la tonnes. The projection for 1990-91 2.90 lakh tonnes. According to rubb trade sources, STC's release of 37,0 tonnes had resulted in a price crash Kerala, which even now, were at le Rs. 3 less than the ruling price in Ju 1989.

Tyre industry sources said the gro ers could not hold back their stocks long, and if all of a sudden, large qua tities were dumped into the market af the 'Onam' festival next week, rubb prices would definitely come dow Moreover, the STC was still holdi 10,000 tonnes of imported rubber buffer stock even after releasing 37,0 tonnes a few weeks ago, the sour added.

$200m ADB LOAN FOR TN POWER PLANT

The Asian Development Ba (ADB) has approved a $200 milli loan to support a thermal power proj in North Madras, India, an ADB sta ment released at Manila said.

The bank also approved two tech cal assistance grants, totalling $ 1. million for environmental purposes support of the project, the statem added.

The loan will support the increasi of the capacity of a thermal power s tion in Madras which will utilize lo coal to provide an additional supply electricity for the State of Tamil Na the Manila-based bank said. The lo will also go to expanding and stre thening the transmission and distri tion system for Madras and improv

ody for alternative energy sources mooted

The minister of state for environment d forests, Mrs. Maneka Gandhi, has ggested the setting up of an "alter- tive energy sources commission",

The commission would have the wers and authority of the Atomic ergy Commission to chalk out vironment-friendly strategies to meet e country's energy requirements.

India had invested enormous resour- s and technical manpower in devel- ping conventional energy sources hich, as experience proved, posed a reat danger to the environment, Mrs. andhi said in a lecture at New Delhi n Aug 29, on "Fulfilling our tryst with estiny: An Indian agenda for environ- ent."

Stressing that the answers to the ountry's energy needs would only lie n non-conventional sources of energy, Irs. Gandhi urged that a beginning be nade to give the same type of resour- es and support to developing alterna- ive sources of energy.

There was need to examine if in the ase of some of the options which were aid to be economically unviable, their nvironmental benefits could also be alculated, she said.

Mrs. Maneka Gandhi emphasised the eed for introducing clean technologies nd promotion of environement-friendly roducts. "We in India must insist on our industries adopting clean technologies wherever available," she said, adding that a policy of 'polluter pays' would go a long way in curbing the use of pollution-causing technology.

"We have to devise laws and systems where the polluter pays for the consequences.... once such systems are devised, the polluter will find it conomically desirable to control pollution," she said. Mrs. Gandhi also made a strong plea for the promotion of equity in the distribution of the country's natural resources which she described as "highly uneven" at present.

Dams were for the rich, forest produce were monopolised by middlemen and land was owned by a minority, she said making it impossible to persuade the poor to protect or conserve natural resources.

"They gain nothing if they were to do so. Unless we give everyone a stake in preserving our natural resources, they will not cooperate in the efforts of the government," she said.

Mrs. Gandhi said in setting an agenda for protecting the environment, the highest priority had to be given to the creation of awareness among people of the crucial nature of this task.

"The environmment encompasses every human activity and there is no way it can be protected but through governmental action. We have to convince people that the protection of the environment is in their own interest," she said.

Stressing the need to educate, train and equip every person to conduct their activities in an environmentally beneficial manner, the minister said the common man had to be educated to demand environmentally-friendly products.

"Every official who is involved in any development project must know how to assess environmental impact and how to minimise them. Every politician must be made aware of the adverse effects of environmental degradation on the poor people who are his voters."

Mrs. Gandhi said the environmental lobby in the country had achieved many significant victories including legislations to protect forests, prevent pollution of water and air and the establishment

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of pollution control boards. Among the other achievements, Mrs. Gandhi listed the fixing of standards for all important industries for discharge of pollutants and the declaration of national parks and sanctuaries to cover four per cent of the country's area. The Ganga action plan had been taken up at a cost of Rs. 300 crores to clean up the river. All major public sector undertakings have to go through environmental impact assessment and clearance procedures. About 400 water quality monitoring stations and 160 air quality monitoring stations have been set up and the Forest Survey of India monitored the country's forests every two years with the help of satellite imagery, she said. However, the tasks ahead were enormous, Mrs. Gandhi said.

Out of the polluting industries only about half have installed pollution control equipment and more than a million small scale industries were yet to be tackled.

STATE ENERGY CELLS TO BE SET UP

The Government has decided to set up 'State energy conservation cells' for planning, implementation and monitoring various energy conservation programmes. Inaugurating a day-long workshop in New Delhi on energy conservation in industry, the Power Secretary, Mr. S. Rajgopal, said "so grave are the emerging energy problems that we all should advocate for a slogan 'conserve or perish'.

He said energy conservation had become a necessity in view of the disturbances in Kuwait and Iraq, which were likely to push our oil import bill to over Rs. 10,000 crores for the present year, and long-term economic dislocations in terms of trade, higher external debts, high inflation, slow down of economic growth and possibly higher unemployment. Mr. Rajgopal said the
Government had also decided to ma
available one energy bus to each Sta
provide interest subsidy on loans tak
from development banks and comm
cial banks for financing the energy ef
cient equipment, provide R &
grant-in-aid for development of ener
efficient devices/equipment and co
mission macro-level studies to arrive
definitive view on various policy issu
concerning demand side manageme

The workshop was organised by t
PHD Chamber of Commerce a
Industry (PHDCCI). The Governme
would also provide subsidy for condu
ing energy audit and feasibility studi
commission demonstration proje
schemes to promote energy conserv
tion equipment/technologies which a
in the pre-commercialisation stage, s
ting up of demonstration centres
energy conservation in various regio
and a 'national energy usage' data-ba
Considering six energy-intensive su
sectors, Mr. Rajgopal felt that the
exists an energy savings potential
seven to ten million tonnes per year
energy efficiency measures are unde
taken within Indian industry to bring
closer to international best-practice. M
Rajgopal said while the Governme
can use extreme regulative measures
induce energy conservation behavio
it is not the intention of the Gover
ment to do so except perhaps in tim
of emergencies and that too for sh
periods.

The thrust, as a matter of deliber
policy, would be on facilitative me
sures. He advised the industrial units
develop and adopt energy accounti
and monitoring systems. Introduction
time of the day metering and peak-o
peak tariff was under study. He want
each industrial unit to conduct their o
studies to assess the feasibility of sh
ing load to off-peak hours.

Further, for new units, production a
process cycles should be so design
that substantial part of the load is

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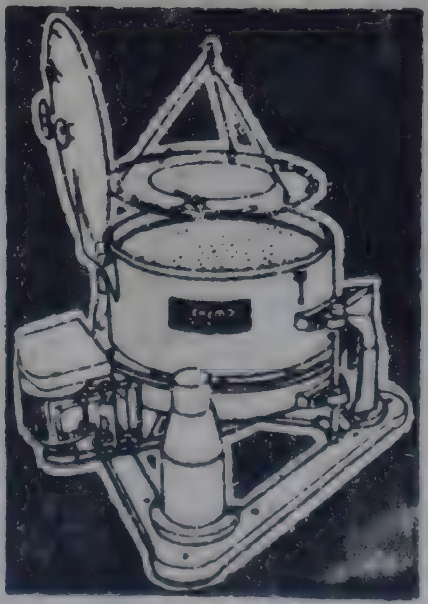

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Environ okay for NOCIL expansion

National Organic Chemical Industries Ltd., (NOCIL) has received clearnaces from the Maharashtra Pollution Control Board (MPCB) and the State's Department of Environment, for its expansion project, according to Mr. Arvind N. Mafatlal, Chairman of the company.

Addressing shareholders at the Company's annual general meeting, he said that the company was confident of complying with the environmental conditions prescribed by these bodies and by the Central Government. As required by the Union government, the Maharashtra Government had initiated the task of undertaking environmental carrying capacity studies of the Trans-Thane Creek Area, which had been entrusted to Enginers India Ltd (EIL), a public sector organisation. Substantial progress had already been made and an interim report had been compiled by EIL.

He asured the shareholders that all steps were being taken to convert the letter of intent for its massive modernisation and expansion programme at Thane into an industrial licence as early as possible.

In the first four months of the current year, the production of ethylene was 25,173 tonnes, compared to 22,935 tonnes in the corresponding period last year. The output of agrochemicals during April-July 1990 was 647 tonnes, against 638 tonnes in the comparable period last year. Sales turnover during April-July 1990 amounted to Rs. 152 crores, against Rs. 120 crores same period last year.

Mr. Mafatlal referred to the visit of Mr. H.de. Ruiter, a group Managing Director of the Royal Dutch/Shell group, in March this year and his endorsement of Shell's support to the company in its expansion project at

borators, the company is building up a strong export base in order to ensure foreign exchange neutrality for the project.

Referring to the volatile international political environment, Mr. Mafatlal said that recent events in Gulf had led to a marked rise in the price of crude oil and to uncertainty about the continuity of future supplies of crude oil.

The saving in foreign exchange through a curtailment of naphtha supplies would be counter-productive since the cost of importing finished products, many of which were permitted under OGL, was likely to be more than three times the value of naphtha saved, he added.

NOCIL's expansion cum modernisation project

National Organic Chemical Industries Ltd., (NOCIL) is one of the pioneering petrochemical companies in the country, incorporated in the sixties with Shell and Mafatlals as the original promoters. The Royal Dutch/Shell Group, which is the largest petrochemical producer in the world presently holds a third of its shares, the Arvind Mafatlal Group holds 14.4%, the public financial institutions 35.4% and the Indian public, the remaining 16.9%. About 30,000 individual investors hold shares in the company.

The petrochemical complex at Thane, which was build in 1968 had become too small in today's environment and its technology is becoming obsolescent. Unless it is modernised and expanded to a minimum economic size, it will become unviable in the next decade or so. The operational costs of the plant have been gradually rising. Upgradation through retrofitting has kept the plant profitable so far, but there are limits beyond which retrofitting cannot help.

and expansion, if sickness of the Tha unit with a consequent threat to t direct employment of its personnel a those of its customers (Polyolefi Industries Ltd., etc) and contractors to be averted.

Care for the environment

NOCIL has always been environment-conscious company. It h spent about Rs. 34 crores at Thane a Lote during the last 10 years on pol tion control measures. In fact, it h taken steps to control pollution ev before any anti-pollution law came in force. The Company has been stric complying with every requirement the pollution control laws, all along. T Company is professionally manag and has a good safety record, havi achieved one million manhours witho a Lost Time Injury (LTI) — as ma as seven times by its own employe and three times by contractors' emplo ees in the last five years. In fact, in 19 2 million manhours without LTI, we achieved both in respect of its own a its contractors' employees at the Pet chemical Complex at Thane. This w also achieved jointly by the Compan own and contractors' employees at Agrochemical plant at Lote Parshur in February 1990.

Environmentally acceptable

NOCIL has now received a letter intent for expanding its ethylene cap ity from 63,000 tpa to the minim economic capacity of 300,000 tpa in l with the Government's policy. This p ject will comply with all the ba requirements from the environmen angle. The plant is based in Zone II the Bombay Metropolitan Reg where expansion is permissible. Inde capacity expansions have be approved and have taken place even Zone II (i.e., suburban Bombay) in last few years.

The Company has undertaken ensure that the pollutant load, even erms no more than what has been permitted by the Maharashtra Pollution Control Board for its existing operation. This is possible because NOCIL will be employing state-of-the-art technology, modern instruments and microprocessors. Shell, who are NOCIL's collaborators and Engineers India Ltd., a Government venture, have confirmed that this is technically feasible. Indeed, such high pollution abatement standards have already been achieved by Shell companies elsewhere in the world.

NOCIL's expansion project has, in fact, been more rigorously examined and scrutinised than possibly any other project in India. The company has accepted all the conditions laid down by the Central and State Governments for pollution control and is confident of fulfilling them. Indeed, its collaborators have already ensured this in other countries.

In March 1989, the Maharashtra Pollution Control Board gave the project a 'No-Objection Certificate' after a close scrutiny of the Garg Committee's recommendations, and other facts. It was followed by an environmental clearance given by the State Government in April 1989. The Bombay High Court rejected two writ petitions against the project in October 1989. And eventually the Letters of Intent, stipulating several conditions was issued to the Company in Novemeber 1989.

The Government of Maharashtra has commissioned Engineers India Ltd. to carry out Environmental Carrying Capacity Studies of the Trans-Thane Creek (TTC) area. Hazard Analsis (HAZAN) and Hazard and Operability (HAZOP) studies will be undertaken during basic engineering work which will follow the Government approval of foreign collaboration agreements.

NOCIL has already spent over Rs. 34 crores on pollution control facilities, such as the two phase project for treating effluents (Rs 4 crores) and the Oxychlorination plant (Rs. 13 crores) which uses by-product hydrochloric acid gas to produce ethylene dichloride, the feedstock for PVC production.

The effluents discharged from NOCIL and the the ambient air quality are continuously monitored to ensure safe disposal of effluents and a healthy working environment. Sophisticated detection monitors for Vinyl Chloride Monomer (VCM),Benzene and Ethylene Oxide (EO) are strategically located in the plants.

The company has undertaken an afforestation programme within the Plant and its environs, planting 6,250 trees within the plant site and about 4,800 trees in the vicinity, to be augmented by 3,500 and 5,500 trees respectively. A 2.5 km stretch of the central verge of the Thane-Belapur road is being afforested, with 2,500 trees to be planted in 1990-91.

NOCIL has made an offer to the Government of Maharashtra to fund the afforestation of about 200 hectares of degraded barren forest land to the east of NOCIL site, belonging to the forest department. NOCIL has proposed to stimulate growth by irrigating the forest with its treated liquid effluent (conforming to MPCB norms). The choice of species and and afforestation plan will be agreed upon with the forest department. NOCIL will not seek ownership of the land to be made available or usufruct therefrom. It could serve as a model for other industrial locations.

The proposed afforestation programme should improve the ecology of the vicinity and increase its pollution load carrying capacity.

Why Not A New Location?

A new location for NOCIL's expansion project would involve relocation of around 1,250 employees of NOCIL itself, and around 5,000 employees of NOCIL's customers (PIL, etc), suplliers and contractors who are largely or wholly dependent on NOCIL. T
would be very difficult, in view of
the resistance such a movement wo
bring about.

It will mean a higher cost of Rs.
crores for implementing the pro
(new infrastructure, naphtha pipe
and year's delay in project implem
tation).

Funding of the project to that ex
would be diffcult, and detrimenta
productivity. Additionally, it wo
impose difficulties on NOCIL's c
tomers (some of whom may also
forced to move), affect benefits
Maharashtra and have an adve
impact on Government revenues.

For NOCIL's customers such as
yolefins Industries Ltd. (PIL) —
would call for a corresponding sh
since they are interdependent. T
would mean shifting 5,000 employ
which in turn would have adverse so
and political repercusions.

It may be worth noting that if
relocation of the plant took place
backward area, it would mean, in ac
tion a fresh outgo for the State
account of subsidies and tax conc
sions. These could well be in the reg
of Rs. 500 crores. In other words, i
worth considering whether a unit, wh
on modernisation and expansion, is c
able of ensuring that there is no ac
tion to the absolute pollutant lo
should be relocated in view of the c
sequent heavy financial penalty to
owners as well as the State.

It is also quite likely that Mahara
tra would lose the project altoget
since there are many claims for pe
chem projects from other States. In s
a context, Maharashtra seems unlik
to get another major petrochem
complex after Nagothane in the n
decade. It will thus have to for go di
employment opportunities at Thane
significant employment potential do
stream industries, estimated at 25,0

os, elsewhere in the State. The State ll also stand to lose the revenue pottial that would have been created by y of indirect taxes, estimated at about . 100 crores per annum, if the expanon project is not in Maharashtra.

Unique Project

a scenario of constrained resources, OCIL's expansion project scores over her competing projects, particularly ass-roots projects, because it is unique being entirely self-sufficient in financial and physical resources.

In brief the chief merits of NOCIL's pansion projects and the rationale for are:

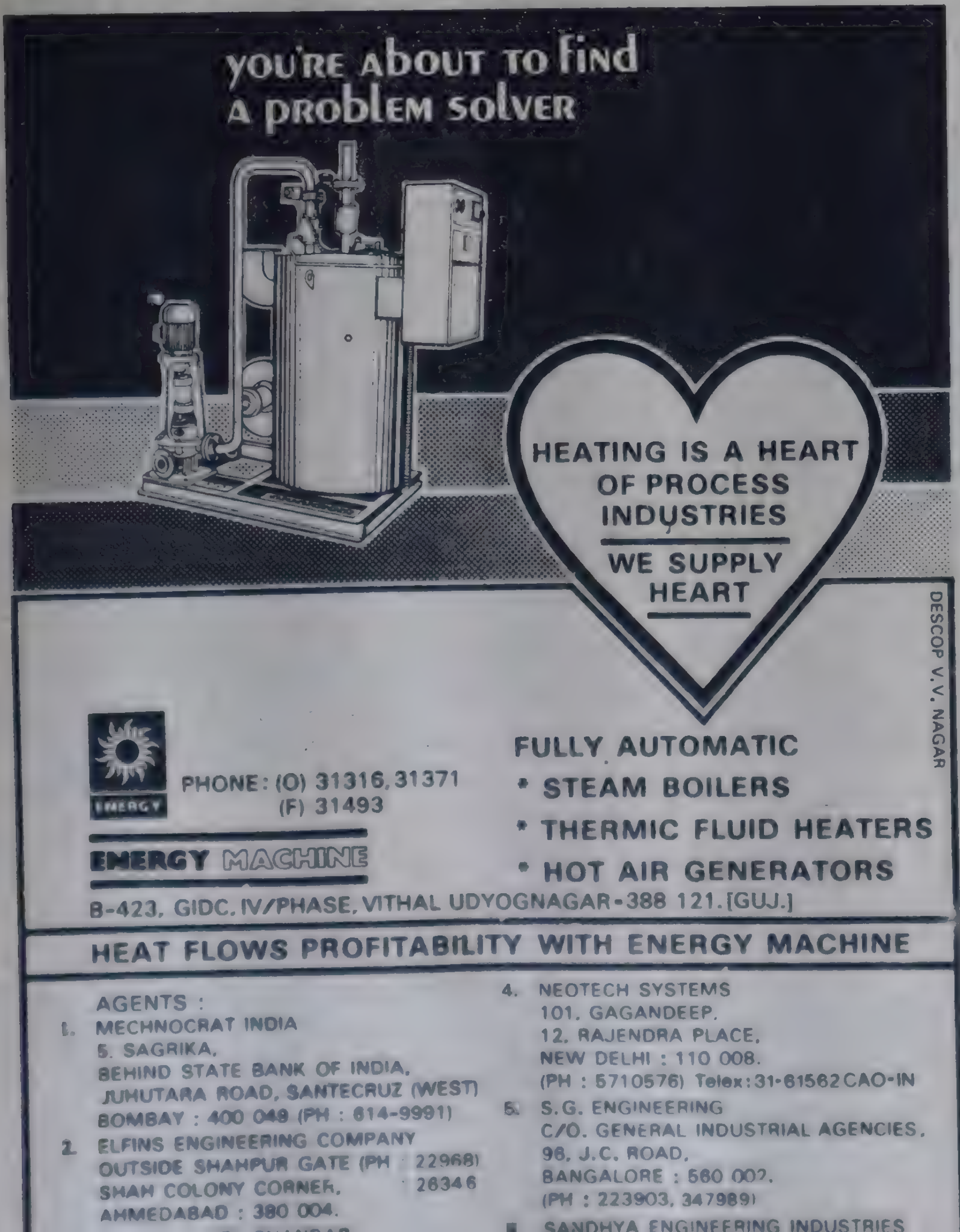
1. Being a proposal for the odernisation-cum-expansion of an xisting (as distinct from a new) unit minimum economic size laid down y the Government, it should have pririty over all new grass-roots proects.

2. NOCIL is likely to be commissioned about one year earlier than a new project, thereby reducing the capital cost (in rupees as well as foreign exchange) and saving foreign exchange of about Rs. 500 crores through the avoidance of product imports which would otherwise be needed.

3. NOCIL's project is presently the only which will raise all its resources (rupees and foreign exchange) from its foreign and local shareholders and the public, without loans being sought from the financial institutions.

Neither the Central nor the State Governments will be required to make a supporting investment in infrastructure or pay backward area concessions.

4. NOCIL has made a sizeable export commitment which will be adequate to meet the needs arising from dividend/-loan service, import of chemicals/spares, etc.



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5. NOCIL will itself find the foreign exchange that may be needed to impor the necessary naphtha through exports; this puts it on par with indigenous gas-based proposals. NOCIL has achieved an export level of Rs. 35 crores in 1989-90 and is confident of increasing this figure progressively to Rs. 100 crores per annum by the time the project is completed.

6. No other petrochemical complex mooted in the country so far, is based on an identified foreign partner and a commitment to find all resources without Government aid, and to become foreign exchange self-sufficient.

7. Shell, the largest petrochemical producer in the world, has fully backed NOCIL's proposal with its considerable technical, financial and managerial resources. This will be the first billion dollar project in the private sector with a foreign partner in India and its progress will have a demonstration effect by attracting other potential foreign investors.

8. NOCIL has accepted all the environmental conditions laid down by the Government and has undertaken to ensure that the pollutant load from the expanded plant, in absolute terms, will be no more than what is permitted by the State Government for the existing operation.

9. NOCIL has offered to finance the development of an irrigated forest on degraded forest land in the vicinity of the plant at its expense, without seeking ownership of the plot of land or usufruct therefrom. This will improve the ecology of the entire neighbourhood.

NOCIL will be the earliest petchem project to be completed (probably the only one to do so during the 8th Five-Year-Plan), bringing with it the benefits of large import savings and export earnings for the country without call

.P. KHARBANDA

FRANKLY SPEAKING

Dr. O.P. Kharbanda, Cost & Management Consultant,
510, Olympus, Altamount Road, Bombay 400 026

R & D — A Must For Survival!

Much of the so-called 'R & D' expenditure incurred in ndia is, I suspect, for drawing the tax benefits and it is not eally and genuinely for R & D work. Further, company's nnual reports seldom provide figure for R & D expenditure ince it is not yet a requirement by the Company Law Board. rue and genuine R & D is really an investment in the future, nd a worthwhile one, too, if the work is carefully planned nd tailored to company's products and markets. It is necessary for mere survival, too:

> 'If you do not invest (in R & D) today, you are not apt to be around tomorrow' — Robert Forney, an Executive VP, Du Pont.
>
> .....the thing that is driving us is very simply the idea that we want to survive' — Robert Sinclair, VP (Engineering) Chrysler.

What exactly is R & D spending? The definition has been rather vague, specially until about 1974 when the Financial Accounting Standards Board (USA) laid down the precise scope. As interpreted by Standard & Poor (Industrial Compustat, NY, 1986):

> R & D expense represents all costs incurred.... (for) the development of new products or services..... only the company's contribution.....includes both software expenses and amortisation of software costs....excludes customer or government-sponsored R & D; extractive industry activities; engineering expenses....to improve the qualities of existing products; inventor royalties; and market research & testing.

Until this ruling there were widely different interpretations as to what is covered by R & D, e.g., Proctor & Gamble included consumer preference surveys as R & D, while AT & T included only the most advanced and fundamental scientific work at Bell Laboratories. An interesting study and an exhaustive analysis of R & D spending in the USA f seven research-intensive industries, published recent (Samuel B. Graves: 'Long Run Patterns of Corporate R & Expenditure — A descriptive analysis of the period 1965 1984' Technological Forecasting and Social Change, Vol. 3 No. 1 13-27, 1989) may hold some lessons for us in Indi

Two decades (1965-1985) of R & D performance are ex mined, using two measures of R & D expenditure, as % sales and as amount per employee — for seven selected indu tries. All figures were converted to 1979 $ using deflato specifically recommended for R & D. The seven R & I intensive industries selected: Chemicals and allied product 1. Chemicals, plastics and synthetic materials; 2. Drugs ar pharmaceuticals; 3. Soaps, detergents and other chemical 4. Electrical equipment, machinery and appliances; 5. Ele trical computing equipment; 6. Computer peripherals ar electromedical apparatus; 7. Aircraft and missiles. Thes industries were found among the highest in level of R & I effort and 'characterised by a high proportion of engineer and scientists to total employment and rapid technologic change. R & D expenditure expressed as a % of sales showe a U-shaped pattern, with a decline from mid-60's to th mid-70's and then a rebound to early 80's. It was also foun that continuous process industries (1-3 above) have greate stability in R & D effort, while fabrication and assembl industries (4-7 above) show greater variability. Useful as may seem, the analysis has posed some vital questions, e.g

1. Chemical and computer industries exhibit a rea increased R & D spending over the period of study. But ha this expenditure been rewarded (relative to other industries in terms of market share, return on investment or any othe measure of performance. 2. Manufacturing method, continuous process vs fabrication and assembly, seems relevant i determining R & D stability — but this needs to be teste over a wider range of industries. 3. How this pattern for U.S industries compares with that in West Germany and Japan' It is surmised, for example, that R & D funding in Japan i maintained despite adverse economic situation, wherea American companies are inclined to reduce it under pressure of cost cutting. This is perhaps one reason, among others why USA has been lagging in the technological race in comparison to Japan.

Dr. Kharbanda, a Fellow of the Institution of Chemical Engineers, is a visiting professor and author of repute. His recent title: CAPITAL COST ESTIMATING IN THE PROCESS INDUSTRIES, (Butterworth, 1988). Forthcoming titles: (All with Mr. E.A. Stallworthy) WASTE MANAGEMENT — TOWARDS A SUSTAINABLE SOCIETY (Gower, 1989) & PROJECT TEAMS — THE HUMAN ELEMENT (Ntl. Computing Centre, 1990). Available from Vivek Enterprises, 5 S.K. Barodawalla Marg, Bombay 400 026.

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Highlights in Chemical Technology (Part 2)

NEW SOLID STATE THIN FILM ATTERY GIVES NEW HOPE OR BATTERY POWERED UTOS

The Univ. of California (Berkeley) is egotiating for transferring its technology for solid state thin-film batteries of reat promise for use in electric autos, atellites and other applications, where veight and volume are crucial factors.

The key to the batteries is a class of naterials discovered by Lawrence Berkeley Laboratory, called solid redox polymerization electrodes (SRPEs). According to developers, SRPEs, can be made from a variety of inexpensive materials. They have excellent electrochemical reversibility and cyclability, which implies a long service life.

The batteries are constructed by sandwiching a solid state polymeric electrolyte — typically polyethylene oxide complexed with salts — between a thin film SRPE cathode and a thin foil of alkali metal, such as Li or Na. SRPEs consist of long-chain polymers (S-R-S) with linkage between the sulfur atoms. The electrons transferred break the S-S bonds, releasing energy and forming alkali metal thio salts that repolymerize under charging conditions.

At 80 °C, the SRPE battery has about twice the capacity per unit volume of lead acid nickel-cadmium cells, at about half the weight. At ambient temperatures, it exhibits about 30% more capacity. (*Chem Eng.* 6/1990, p. 19).

A NEW PROCESS FOR PRESERVING OLD BOOKS & MANUSCRIPTS

FMC Corporation (USA) last May launched its paper preservation demonstration plant which will demonstrate how to strengthen up to 300,000 books per year. The process treats books by nesium butoxy triglycolate, which neutralizes the acid in the paper and deposits a buffer that inhibits future acid damage. The firm plans to build commercial scale plants worldwide based on the above new technology. (*CMR* 1/29/90, p. 5) (*CMR* 5/14/90, p. 24).

HARNESSING SOLAR ENERGY FOR METAL CLADDING PROVES ECONOMICAL

A solar technique for hardening steel and copper alloys and for putting hard metal claddings on steel substrates, promises to be less costly than the conventional energy-intensive methods that employ lasers and arc lamps, reports Solar Energy Research Institute, (SERI, Golden Colo, USA).

In the metal cladding work, powders of nickel-chromium alloys, stainless steel and tungsten carbide-cobalt are deposited on steels, then melted and diffusion-bonded to the surface. A parabolic concentrator and a special optical device intensify the sun's power by up to 2,500 times, to 250 W/CM^2. This concentrator can produce temperature up to 2,400 °C, which can melt or evaporate any known material.

A larger concentrator, able to produce power up to 3000 W/CM^2, is scheduled to start up in the Fall of 1990. The higher power should allow processing to occur quickly, without heating the underlying structure. SERI expects to be able to do surface hardening by the new method as little as 1 S, compared with 3-10 S for the present 250 W/CM^2 unit. (*Chem Eng* 5/1990, p. 19).

A MEGA PHOSPHORIC ACID PROJECT TO PRODUCE PHOSPHORIC ACID PLUS PORTLAND CEMENT

What could be the world's first mega size totally integrated facility for cement is scheduled to break ground 1992. The $ 1-billion complex, to built by Consolidated Minerals In (Leesburg, Florida), will produce 2 million tons/year of phosphoric ac The site also will include a 4 milli tons/year phosphate rock mine and 600 MW coal fired power plant.

Phospho-gypsum from the pho phoric acid plant will be dried, th blended with power plant ash, alumi and iron silica. The mixture will then heated to 1900 ° F in a coal-fired flu dized bed and directly fed at abo 1800°F to the cement kiln.

During the heating process, SO_2 w be recovered, cleaned and used to mak surface acid. The H_2SO_4 will reacted with phosphate rock — pr treated to remove any radium-226 an fluoride — to make phosphoric aci (*Chem Eng* 5/1990, p. 25).

A NEW METHANOL CATALYS UNVEILED BY ICI (UK)

A new catalyst has been recentl reported from ICI (UK) research. Thi new catalyst called 51-3 is reported be more stable and thus lasts 50 longer the previous methanol synthesi catalysis — 4 1/2 years instead of years — reports ICI Katalco (Chicag USA), which is marketing the produc developed by ICI (UK). Other benefit claimed include: improved catalys activity, which translates into greate flexibility and increased efficiency, hig strength, which allows the catalyst withstand plant upsets and high specif icity, which minimizes by-products.

The composition is a proprietar secret, but it is reported that the new ca alyst has an active copper phase sup ported on a specially designed zin aluminate compound. The latter pro vides mechanical strength while allow ing reactant gases access to the copp xide protects the copper from contam- nants during operations. (*Chem Eng* 5/1990, p. 25).

DOW CORNING UNVEILS NEW WATER-REPELLENT SILANE ADDITIVES

Dow Corning Corp has recently unveiled in USA two new proprietary silane additives (under trade names Q1-2306 alkylsilane and Q1-2205 alkoxy silane) for formulations that offer water repellency for buildings, masonary bridges, roadways and parking decks.

These new additives are the products from recent advances in silane technology which has improved their stability to penetrate a substrate. There are two things, which make this technology unique. One is the ability to penetrate to far greater depths than other waterproofing materials.

This will be of great value in protecting parking decks and bridges and will also effectively protect reinforcing base in concrete. Further, the extremely hydrophobic nature of treated substrates resists moisture penetration effects like salt reaching and freeze thaw cracking.

The second important feature is that these new materials use the alkalinity of the substrate for catalysation. This provides greater long-term protection and it also preserves the integrity of the outer surface.

The firm claims these proprietary additives can extend the service of formulated products by 5 to 15 years.

On a roadway or parking deck formulated products using this technology can offer effective protection until the actual surface itself has been worked down 1/4 to 1/2 inch.

On a vertical surface like a building,

DIAMOND THIN LAYER SPAWNS A SUPERIOR DIAPHRAGM FOR LOUDSPEAKERS

A loudspeaker encrusted with diamond could be the latest gift from Japan. A Japanese hi-fi company, Kenwood, has joined forces with the Namiki Precision Jewel Co of Tokyo to develop the loudspeaker, which it is claimed improves the sound (European Pat. Application 341, 589).

Loudspeakers rely on a diaphragm which vibrates rapidly to increase soundwaves. For purity of sound, designers try to make these diaphragms as rigid as possible. A thin sheet of diamond would be ideal, but it has so far proved impossible to produce anything other than a very tiny sheet. Kenwood claims to have solved the problem by using a vapour deposition process.

A dome-shaped base made of titanium or silicon carbide, is sprayed with a plasma of methane and hydrogen in a vacuum. A film of pure diamond forms on the base of the diaphragm's dome at a rate of about 100 micrometres per sq. cm. per hour. This claim the inventor, is up to 50-times as fast as any previous method.

The result is a dome diaphragm coated with a film of diamond about 2 micrometres thick. It is so rigid that the loudspeaker can reproduce sound with frequencies twice as high as those produced by any conventional loudspeaker. Although this takes the reproduced sound well above the range human hearing, hi-fi experts argue that the reproduction of audible frequencies benefits from the faithful reproduction of frequencies which are too high to hear. (*New Sc* 5/26/90, p. 36).

DOW CORNING REPORTS ADVANCES IN SILICONE TECHNOLOGY

solventless coating systems for pap film and plastic substrates used in pre sure sensitive adhesives are yieldir faster cures and longer bath lives in th manufacture of these products. The ne silicone technology requires lower cu temperatures, provides a more comple cure and reduces acrylic lock up.

The firm reports that its 'Syl-Oi 7676 release coating system is the fas est curing, solventless thermal produ line. The system contains a polymer, catalyst and a resin/polymer. It serv as a release base for self-adhesive tape and labels and for water resistant coa ings and glass vial coatings. The product can be used alone or with 767 high release coating to achieve variou release levels.

The 7677 release coating system also a low temperature addition cu product. It is designated for paper substrates, but it can also be used with plastic films and plastic coated substrate Typical applications include labels an one and two sided tapes coated substrates. In another development, th company reports its 1920 powdered si icone antifoam offers food and beve age processors the performance c silicone antifoam emulsions but wit greater convenience than these liqui products. (*CMR* 6/4/90, p. 17).

BERYLLIUM TECHNOLOGY PIONEERED IN INDIA

India has become the second countr in the world besides, the USA t develop the technology for producin beryllium metal and its alloys which ar indispensable for the space programmes, electrical and electronic industries. Scientists at the Bhabh Atomic Research Centre have set up pilot plant to handle about 2 kg of bery lium per batch at Turbhe, New Bomba to produce vacuum hot pressed (VHI beryllium metal and copper berylliu epartment of Space and to a limited xtent to the Department of Atomic nergy for the nuclear applications. esides India, only the USA is currently roducing beryllium and its alloys from ne rain material beryl. Beryl is availble in fairly large amounts in the counry.

Metal beryllium is considered vital or the space industry, especially navgational guidance systems of space ehicles, because of its tightness, high igidity and dimensional stability. Besides their high fatigue and tensile strengths, copper-beryllium alloys find applications in the electronic and electrical industries as springs, diaphragms and electrical contacts in high reliability compounds.

Self-reliance in beryllium technology became essential as India does not import beryllium metal at present. The pilot plant operations, have also provided useful data for the design of a larger size production plant. (*Res & Ind* 6/1990, p. 141).

CHIRAL SYNTHESIS GETS A BOOST IN BRITAIN

British researchers are in the vanguard in chiral synthesis of drugs and chemicals. Therefore the UK government has decided to support a £7 million ($12 million) collaborative research programme into assymmetric synthesis. As part of the Link initiative, it is giving £3.5 million over a 5 year period, with funds coming from both the Science & Engineering Research Council and the Department of Trade & Industry. These will be matched by contributions from industry, towards individual products.

Asymmetric synthesis allows the production of pure chemicals free from enantiomeric forms. As such, chemicals with distinct properties can be produced, giving better performance and freedom from potential side effects in drugs. This asymmetric synthesis give hopes for the new drugs and therapies in the pharmaceutical sector.

Already 47 industrial and 13 science-based organizations have shown interest in the programme, which is focusing on fine main areas of research:

(a) New drugs, reagents and catalysts.

(b) Fundamental understanding of key reactions

(c) Routes to asymmetric C-C bond formation

(d) Asymmetric oxidation and reduction reactions and

(e) Enabling technology for larger scale synthesis of drugs and chemicals.

Bot Malpas, chairman of the LINK steering group, comments 'There are opportunities here for many small firms in the fine chemicals sector — and there is scope for highly innovative products in this area of considering technical risks'. (*ECN* 7/2/90, p. 32).

CFC-FREE REFRIGERATION TECHNOLOGY BASED ON THERMO-ACOUSTICS ON THE HORIZON

A new refrigeration technique based on sound waves (thermo-acoustics), developed by US researchers for use in space may bring revolution in refrigeration technology and provide CFC-free refrigeration in future. This breakthrough may save the ozone layer and pose a serious threat to the present day refrigeration technology.

The new technology called cyrocooler (based on thermo-acoustic principle) and developed by a team of researchers Thomas Hofler. The new technique uses 2-inch loudspeaker to produce sound waves that energizes air trapped in a 20-inch long plastic tube to heat one end of the tube and chill the other — hence the technique is called thermo-acoustic.

According to report in Washington Times that the new technique comprises a commercial loudspeaker driver, aluminium cone driving piston, flexible gas and heat flow out, heat exchange cooling plate, and an acoustic resonat An ultra light aluminium cone attach to the voice coil of a commercial lou speaker drives the cyrocooler. T experimental model is about 20-inch long.

Even though appliances using t new technique would be employi soundwaves to keep cool they would n be noisy. From the outside everythi would be silent, reports Research Lab ratory at California where the new tec nique has been developed. T researchers have developed a perfe sound insulation so that in future t new refrigeration based on the abo technique could be sound proof.

Thomas Hofter, the discoverer w recently honored by the Acoustic Socety of America. He estimated that 4-inch loudspeaker could cool a stan ard refrigerator. A clear asset of the ne technology is that air does not use chl rofluorocarbons (CFCs), a key ingre ient in the present day refrigeratio which is blamed for destroying th ozone layer. The new technique ha been patented and negotiations a under way with an undisclosed manufacturer to develop the world's firs acoustically driven refrigerator.

A COMPOSITE CONSTRUCTIO MATERIAL THAT SOLIDIFIES I WATER

A flexible, waterproof material tha will solidify in water has long bee desired in civil engineering. Recently a flexible, waterproof cement that solidifies in water is described by A Nor yoshi, Fukai and Takeuchi. Calle Aquaphalt, it is composed of an aspha emulsion, cement and a water-absorbin polymer.

The components are liquid at ambient temperature and can therefore be pumped, but they form a gel almos instantly when mixed. The hardene mixture is similar to hard bituman an s very low water permeability, high ictility and good adhesion to other aterials. Its high ductility is important r use in earthquake prone Japan.

Aquaphalt is especially suitable as a ackfill material in tunnels located in oft ground under high pressure and as n anti-liquefaction agent for protection f building exposed to earthquake azards.

The key ingredient in Aquaphalt is Accogel which is a liquid polymer mulsion, in which the polymer consists of a cross linked polymer prepared with ationic methacrylate polymer aggregated into particles of size 3-5 μm. It has a water absorbing capacity of more than 300-times its initial volume in fresh water. (*Nature*, 1990, p. p. 230-232). *Chemtech* 7/1990, p. 387).

GRAPHITE FLUORIDE MAKES A DEBUT AS A NEW MATERIAL IN USA & JAPAN

Graphite fluoride (GF), was first synthesized in 1934 (Anorg Alla Chem 1934, 217, 1). This was followed by some important work on the synthesis, structure and nature of its chemical bond, but no practical use of graphite fluoride was found until recently. Graphite fluoride is now commercially available in USA and Japan. In Japan several fluorine companies e.g. Daikin Kogyo Co Ltd and Central Glass Co Ltd produce white and gray graphite fluorides from petroleum coke and artificial graphite on an industrial scale (Preparation & Industrial Applications of Organofluorine Compounds, Banks, R.E. et al., Ellis Harwood Ltd, Chichester, 1982, ch. 9).

Graphite fluoride is a stable compound in ambient environments and a high temperatures. But the productio of graphite fluoride requires large quantities of fluorine gas and presents man problems. As the transportation of fluorine gas is dangerous in cylinders, a company that wants to produce fluorin chemicals should produce fluorine ga in situ by electrolysis. The science an technology of electrolytic production o fluorine gas is just beginning and Japa and USA are world leaders in this field

The high stability and surface properties of graphite fluorine promis useful applications in several fields. Yo cannot wet graphite fluoride. Tha makes it a near ideal lubricant. Its stability at high and ambient temperatures coupled with its non-toxicity and eas preparation promise a bright commercial future for this new fluorine material. (*Chemtech* 7/1990 pp, 426-430).

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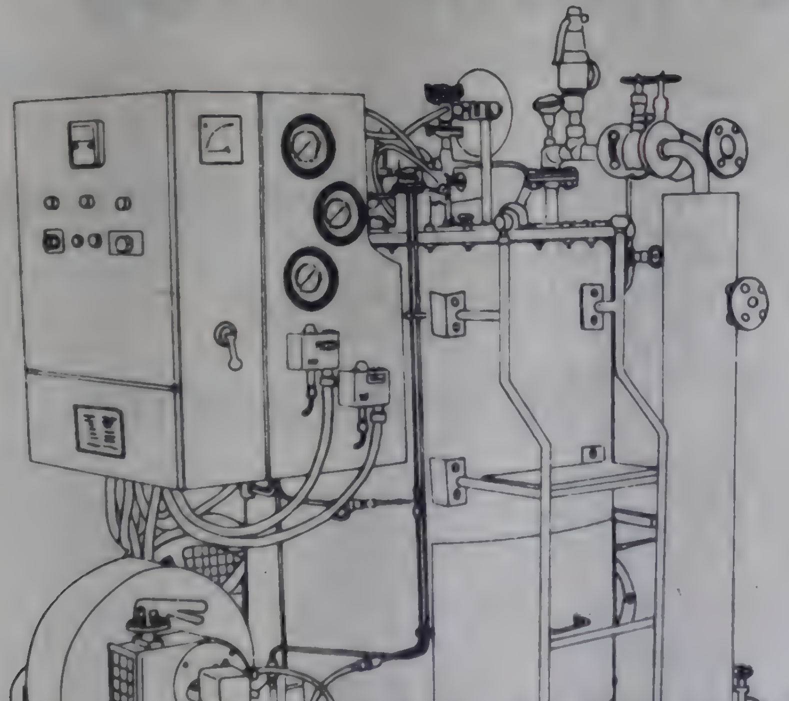

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Science Briefs

EED EXTRACT PROLONGS EAFOOD SHELF LIFE

Seed extracts from the Indian red-ood tree might help prolong the shelf fe of seafood by the action of chem-cals that inhibit bacterial activity, sci-ntists from the college of fisheries in Mangalore have reported.

A fraction of the crude seed extract f the tree Adenanthera pavonia inhib-ted bacterial activity which causes fish o rot, according to the scientists who tudied the effect of the extract on fish poliage bacteria.

Seafood spoils primarily through bac-erial activity. The bacteria help produce dorous chemicals, mainly trimethyl-amine and other volatile sulphur-containing compounds like hydrogen sulphide.

The scientists N. M. Sachindra and ddya Karunasagar separated the extract into three fractions through a chromat-ographic separation process.

Reporting their findings in the Jour-nal of Food Science and Technology, the scientists said one extract which contained organic compounds called ketones inhibited the production of hydrogen sulphide and trimethylamine by bacteria. The researchers used sev-eral species of bacteria in their tests.

The production of hydrogen sulphide by bacteria is due to the action of an enzyme on cysteine. The ketones present in the extract inhibit the en-zyme, the scientists said in their re-port.

Prawns gives a dip-treatment in this fraction had lower bacterial counts and the levels of trimethylamine and vola-tiles like hydrogen sulphide were lower than in the controls, they said.

-- P.T.I. Science Service

HYDROGEN PRODUCTION FROM BLUE-GREEN ALGAE

Scientists in Hyderabad have screened several species of blue-green algae found around their city and iden-tified one that liberates hydrogen using only sewage water and sunlight as the main raw materials. The researchers from the microbial physiology labora-tory in the department of botany in Osmania University studied seven spe-cies of algae to evaluate their hydrogen production and biomass accumulation efficiencies.

Although blue green algae were shown to be potential sources of hydro-gen long ago, most of the research had been confined to heterocystous cyano-bacteria. The filamentous forms are more advantageous because of their low cultivation costs, easy handling and the use of naturally available raw material.

The Osmania study, aimed at eval-uating nonheterocystous filamental forms for the liberation of hydrogen gas and biomass yield, showed that a spe-cies designated as OU-111 had the highest biomass yield and hydrogen production.

Reporting their work in the Journal of Microbial Biotechnology, the group has recommended the exploitation of waste waters including industrial wastes for the use of blue-green algae for hydrogen generation. The use of waste water for algal biomass is economically beneficial because the unused nutrients can be converted into useable biomass. Their experiments showed that the strain OU-111 could grow better if the sewage water present in the culture medium was diluted with 75 per cent sewage water.

In low dilutions, the hydrogen pro-duction was low, but increasing the sewage content gave higher rates of

however found that in 100 per ce sewage water the hydrogen producti and biomass yield were low. Free ce of the OU-111 showed photoproducti only for a short time. To improve t hydrogen rate and time, the strain w immobilised with sodium alginate. Th led to an increase in the hydrogen yie from a previous optimum of 9.93 moles per microgram to 13.5 n mol per microgram.

-- P.T.I. Science Servic
August 16-31, 199

BIOCIDE GENE CLONED IN E COLI

Indian biologists have engineered th genes of the bacterium Escherichia co to make it secrete a larvicidal toxin pro-duced in nature by another species o bacteria called Baccilus thuringiensis

The studies, conducted by scientist at the microbiology and agriculture divi-sion at the Bhabha Atomic Researc Centre in Bombay, show that the trans-genic E coli were more toxic to larva than the parental B thuringiensis. Bac-cilus thuringiensis is a sporulating bac-terium that produces a crystalline body that contains proteins toxic to the larva of a variety of insects. The toxins mad by B thuringiensis are protoxins which are proteolytically activated in the midgut of the larvae to produce smaller active toxins.

Reporting their work in the Indian Journal of Genetics, the three-member team said that a gene from a subspecies of B thuringiensis called Kurstakin expresses very efficiently in the trans-genic E coli. The immediate response of the larvae of Spodoptera liture fed on leaf discs treated with the E coli was a cessation of feeding. The larvae also showed growth retardation.

The scientists reported a very high level of toxin expression in the E coli, leading to its accumulation as insolunclusion bodies were found in more han 95 per cent of transgenic E coli fter overnight growth. This contrasts vith the parental B thuringiensis strain hat takes upto four days to reach the porulation phase and shows crystals in nly 50 to 60 per cent of the cells, the esearchers said in the journal.

The crystal formation in the B thuingiensis is also highly influenced by he growth conditions and is not a stable haracter in the majority of the strains. 'As the inclusion bodies made in the E coli can be easily separated, the transgenic E coli could provide a convenient source for harvesting the toxin'', the scientists said.

-- P.T.I. Science Service,
August 16-31, 1990

PROTEIN A HAS ANTITUMOUR EFFECT

A multipotent immunomodulator called protein A which protects the body against the toxic effects of drugs and chemicals might also have anti-tumour activity, scientists at the Industrial Toxicological Research Centre, Lucknow, have shown. In animal tests conducted at the Centre, mice transplanted with upto a million viable tumour cells were treated with protein A from the first day of transplantation for four weeks, twice weekly. The therapy resulted in lesser tumour incidence and significant inhibition of tumour growth. The treated animals also had better survival rates than untreated controls. ITRC said in its latest report on research activities.

The treated animals also showed gain in body weight, an increase in the peripheral blood leucocyte count and a significant increase in the macrophage number and function, the ITRC has reported. The stimulation of the macrophage number and function by the protein could be related to its anti-tumour activity, according to ITRC.

given to mice having established tumours in different regimens of treatment. The group of animals which received a cumulative dose of 78 micrograms of protein A thrice a week showed long survival and significant inhibition of tumour growth. The effect of lymphocytes from the spleen of protein a treated tumour-bearing animals showed marked cytotoxicity against Sarcoma-180 target cell. This suggests the generation of anti-tumour immunity in the protein A treated mice, the ITRC report said.

The results also indicate the potentiation of cellular and humoral imune responses in these animals receiving the cumulative dose of 78 micrograms protein A which also brought about the destruction of tumour-cells and significant inhibition of the growth of S-180.

-- P.T.I. Science Service,
August 16-31, 1990.

ON-LINE CHLORIDE MONITOR FOR SODA ASH INDUSTRY

The Chandigarh-based Central Scientific Instruments Organisation (CSIO) has developed a computer-based on-line chloride monitoring system for use in the soda-ash industries. Soda ash is manufactured by carbonating commercial brine where sodium bicarbonate and ammonium chloride are produced. The bicarbonate is filtered and washed to remove chlorides and calcined to produce soda ash.

The specification for soda-ash demands that the chloride content in the final product remains within one per cent. To regulate the chloride in the final product, the bicarbonate wash water should be adjusted critically by evaluating the chloride content in the bicarbonate state itself. The bicarbonate cake after washing is transported through a conveyor belt for calcination to covert it to soda carbonate. It is thus necessary to monitor the chloride content in the be done. Until now there had been n technique reported for the estimation c chloride in bicarbonate in the soli phase. So before controlling wash wate it has become essential to estimate th chloride content in the solid phase of th bicarbonate.

The technique developed by CSI depends on electrochemical principles Following extensive trials, the shape size and construction materials for th detector have been finalised for on-lin monitoring, according to a CSIO newsletter. The signal obtained from th detector is fed to a computer for furthe processing and control of the wash water which is adjusted through an electropneumatic valve. The valve exit i controlled by the computer.

The system has been subjected t tests at the Tuticorin Alkali Chemicals and Fertilisers continuously for two months and has worked satisfactorily the CSIO said. The introduction of the system has led to significant reductions of chloride in the final product. It could consistently be brought within the narrow range of one per cent.

-- P.T.I. Science Service,
August 16-31, 1990.

TERNARY ALUMINIUM ANODE FOR CATHODIC PROTECTION

Scientists at the Central Institute of Fisheries Technology (CIFT), Cochin, have developed a ternary aluminium anode — CIFTAL — for cathodic protection of marine structures. Made of high-purity electrical conductor-grade aluminium, electrolytic zinc and analar tin, CIFTAL is free from mercury which pollutes aquatic environments. CIFTAL was alloyed in a muffle-furance flushed continously with nitrogen. According to a CIFT scientist, metals undergo heavy damage due to corrosion in the aggressive marine environment. The corrosion becomes more prounced when faultily-alloyed metals rge amounts of highly ioniozed salts, hiefly sodium chloride. Fishing boats re constructed using dissimilar metals uch as bronze, copper, stainless steel, luminium and iron. Interaction of these metals with an electrolyte like seawater eads to galvanic corrosion. Galvanic orrosion is an electrochemical process aused by the interaction between diffe- ent metals electrically connected to one nother through an electrolyte or a me- ium that can conduct electricity. When lectrodes are electrically connected, a urrent flows between them. The quan- ity of current flow between the metals depends on the potential difference between the electrodes. The potential of he positive electrode or anode and the negative electrode or the cathode can be changed by the current flow. This change in electrode potential is known as electrode polarisation. The ability of CIFTAL anodes to function at a high current efficiency and their highly stable performance was particularly noteworthy. Service trials on fishing boats showed a very high degree of protection and near depletion of the anode mater- als. There was no sign of polarisation of the anode consequent to hard corrosion products, the scientist claimed.

-- P.T.I. Science Service,
August 16-31, 1990

CVD DIAMONDS: MAKING A MARK

Intensive research on diamond films has paid off. A wide range of products made from this material has started to arrive in the market. It is a well-known fact that diamond is the hardest material known: it has the highest thermal conductivity at room temperature, it is totally inert, and it is an excellent insulator. Diamond is also transparent to visible light, infrared and ultaviolet radiation, and x-rays, and as a semiconductor it has several advantages over silicon for making electronic devices. In the early 1980s, Japanese researchers announced a way to make diamond films with a technique called chemical vapour deposition (CVD). The CVD method was not only more versatile than the existing high-pressure procedure for making artificial diamonds, but was expected to be less costly because it was simpler, according to the journal "Science".

Now, CVD diamond products are arriving in the market. The first products seem ordinary like wear-resistant coatings for cutting tools and heat sinks to keep sensitive electronic components cool. But recently, scientists have come up with more interesting uses. The can be found in stereo speakers, as windows in scientific instruments, as scratch-proof coating on sunglasses and as masks for use in x-ray lithography. Reports say the ultimate economic impact of this technology may outstrip that of high-temperature superconductors. Scientists were first attracted towards diamonds in the 50s. They showed that synthetic diamond could be produced by applying high temperature and pressure to graphite. In the earlier method, graphite was heated in the presence of a metal catalyst, such as iron or nickel, to around 1500 degrees celsius at a pressure of 50,000 to 65,000 atmosphere. Under these conditions, the carbon dissolves in the metal and begins to form diamond crystals along the metal. The result after several hours is a sheet of diamond on the metal substrate that can be a millimeter or more thick. On close examination it is revealed that diamond film consists of countless tiny diamonds, each a few micrometres across.

But this method has a variety of disadvantages, for instance, diamond sheets cannot be made beyond two to three inches across. The composition of the sheets are such that they cannot be used for semiconductor devices. Researchers around the world attempted to develop and improvise on the method but were largely unsuccessful until the Japanese breakthrough in the early 80s. The Japanese found a method by which they could grow pure diamond films at normal pressures fast enough to be of commercial value. Their proce started with a mixture of hydrogen g and methane or other hydrocarbon such as acetylene, inside a vacuu system. Heating the mixture to abo 2,200 degrees celsius with microwave or hot filament breaks up both th hydrogen and hydrocarbon gas molecules, and carbon atoms begin to condense on a plate of silicon or other material that is put in the chamber. A diamond film made of countless tiny diamond grains slowly builds up on the substrate.

Recently, innovations have taken place on the Japanese method. The best results come from mixtures that contain about 99 per cent hydrogen to one per cent methane. In what is something of a mystery, the hydrogen prevents the carbon atoms from forming garphite and instead pushes the system towards a diamond structure. The CVD diamonds have properties similar to synthetic diamonds made with high pressure but have an edge over them. For one, larger sheets can be made to the extent of 12 inches width.

These diamonds are better for certain cutting tools where the instrument must be several inches long and joining two diamond films is not practical. They have also a smooth finish unlike diamonds made from the high pressure method. One of the potentially most valuable properties of the CVD diamonds is their high thermal conductivity. Pure single diamonds, with a conductivity at room temperature of about 21 watts per centimetre per degree celsius, conduct heat better than copper, for example. However a number of obstacles still face CVD diamonds.

For one, the expected cost advantage over high-pressure diamond hasn't materialised. A variety of materials problems must also be overcome if CVD diamond is to live up its promise. The scale of research indicates that it is a only a matter of time before the full potential of CVD diamonds is realised.

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EW OXYGEN CONTROL YSTEM TO CUT BOILER GAS MISSIONS

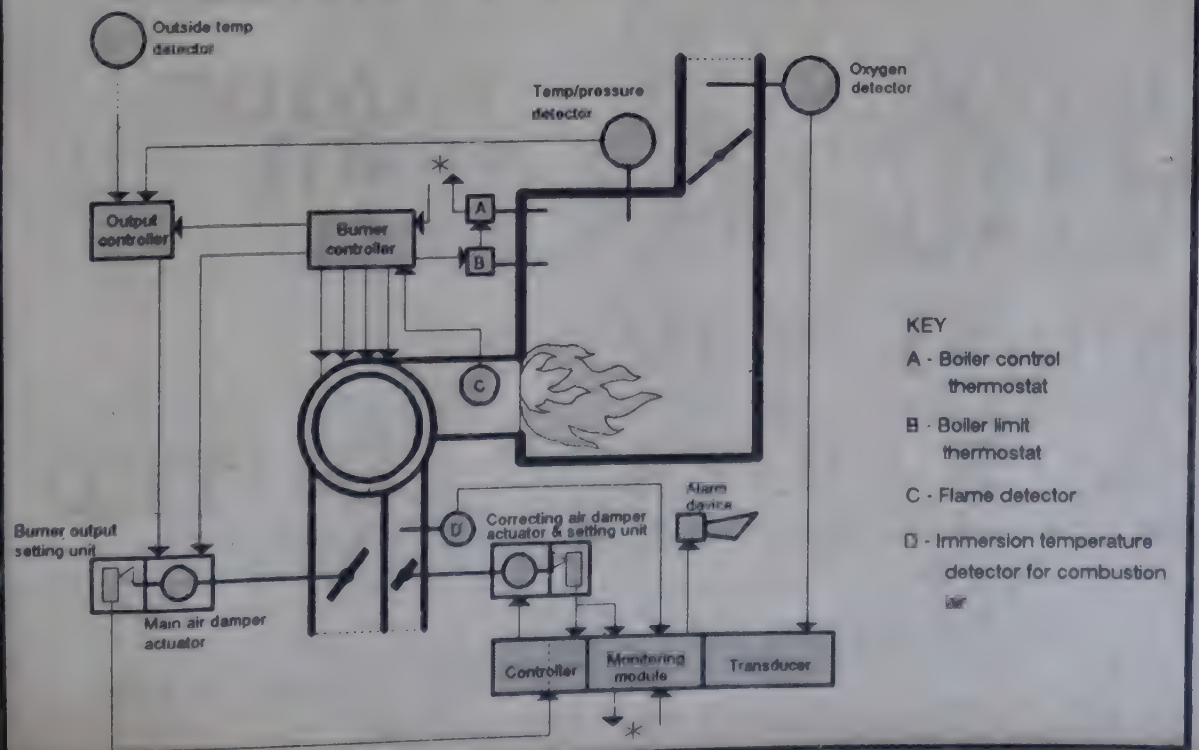
new oxygen control system for mproving the combustion efficiency of oilers and reducing the amount of pol- utant gases that are emitted into the tmosphere has been launched by ondon-based Landis & Gyr. They laim that installation of the system would enable significant energy savings and at the same time would reduce boiler emissions of the 'acid-rain' flue gases, carbon monoxide and nitrogen oxide, by up to 30 per cent.

The system is suitable for boilers with a power output of one megawatt or over and the potential UK market for this type of system is estimated to be about 600 per year. Combustion of any fuel requires it to be mixed with a certain amount of oxygen, usually extracted from the air. Too little air leads to incomplete combustion, with energy losses and the production of poisonous and environmentally-friendly gases such as carbon monoxide.'

Too much air leads to a cooling effect of the flame and to increased concentrations of pollutant gases. Perfect combustion is not possible to achieve in practice because there are so many variables affecting combustion. However, when an Oxygen Control System is installed, the boiler can be operated with the optimum efficiency. The new system utilised a Landis & Gyr QGO oxygen detector which measures the oxygen content in the flue gases. The QGO utilised a highly accurate zirconium dioxide cup-shaped cell, with platinum electrodes and a ceramic-based flow path for the flue gases.

The QGO is linked via a transducer to a Polygyr RWF61 control unit for controlling the oxygen intake on modulating boiler burners. The RWF61 receives the actual oxygen content value measured by the QGO, compares it with the set value and signals any deviation to an RZF61 monitoring module unit which then sends an adjustment signal to the correcting damper on the air intake..

SCHEMATIC DIAGRAM OF LANDIS & GYR'S OXYGEN CONTROL SYSTEM FOR REDUCING 'ACID RAIN' BOILER EMISSIONS



FLUID BED HEAT EXCHANGERS TO BEAT FOULING PROBLEM

The use of fluidised bed heat exchangers designed' to overcome surface fouling problems, commonly encountred in transferring heat to so laden liquids is being demonstrated w EEO support at Iggesund's Workingt paper mill.

Here, two Eskla heat exchangers ha been installed to heat the white wa streams on a paper making machi The heat exchangers use a fluidised b of glass particles, whose mild scouri action should prevent any build up the fibres present in the white wate

The objective is to improve proce efficiency by heating the white wat streams. As well as increasing machi throughput, this is expected to achie energy savings, worth around £280,00 annually by the total elimination steam used to heat the process water, b reducing ex-press moisture levels fro 57.5 per cent to 56.5 per cent which turn will give a 4 per cent reduction the steam demand of the drying sectio as well as a 3 per cent improvement output rates and a reduction in brea

Early results are encouraging, M.K Varma, Iggesund Paperboard's opera tions efficiency manager reports. "Th fluidised bed heat exchangers have bee in operation since early February. Onc running, the sytem has required ver little attention from the operators despit its complexity. No attempt has bee made yet to optimise the system sinc it was felt that operators should first ge used to the new conditions on the boar machine resulting from much highe white water temperatures.

"The major part of the benefits ar expected to arise from the eliminatio of live steam usage in the white wate tanks. The white water temperature o 45-50°C now being achieved is 10-15°C higher than that maintained by use o steam. This has enabled the use of stea to be discontinued and additional benefits, in terms of reduced ex-press moistures and higher output rates, are als being achieved as a result of the high temperatures. These benefits will be ver-ed in due course from monitoring of ng-term trends. "So far there has been indication of glass balls escaping om the heat exchangers and operator nfidence is gradually increasing. The at transfer rates of the heat exchangs are being monitored to show if any uling occurs over a period of time."

Although the system has been oping for a relatively short period, Iggend are confident that the expected yback period of one to two years will achieved. Clearly, if the technique oves successful it will have wide plication in other manufacturing dustries where heat recovery from tentially fouling streams are involved.

OAL ADDITIVE TO AID EFFIIENT BURNING FOR NCREASED HEAT-OUTPUT

The ever increasing prices of energy oupled with decreasing availability of onventional energy sources and creasing dependence of our economy on energy for its growth and development, have perforce indicated that proper utilisation of fuel is as IMPORTANT as the development of new or substitute energy resources.

The supply of poor quality coal not only aggrevates the production losses but also affects the machinery and plant thus causing capital losses due to their shortened life. Coal is one of the major fuels used by all industries. The deteriorated quality of coal with high content of unburnt coal in ash, is causing great concern to the management. Ionics & Colloids Ltd., have been successful in developing a Coal Additive, in order that even poor grade coal is utilised and subsequently increasing the combustion efficiency.

The Coal Additive, HITHERM, is very simple in application. It is supplied in powder form. It is to be mixed with water, and slurry thus obtained is sprayed or sprinkled on coal before coal is put into the furnaces, boilers etc. HITHERM solution is soaked by th coal surface, and enables the coal bein burnt to the maximum, reducing th unburnt coal in ash and also to giv increased heat-output, due to increase void volume and porosity.

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Dyes & Dye-Intermediates — Policies and Perspectives*

K.R.V. SUBRAHMANIAN
Managing Director, Colour-Chem Limited, Bombay

The dyestuff industry in India is unique in many respects. has the potential to become a world leader in the man-facture of dyestuffs but its progress is systematically being essicated by lack of planning, ill-conceived policies, mis-laced priorities and its own, inherent inability to bind ogether and act in concert for the greater good of the country.

Nowhere else in the world will your find so many units roducing so little! In Germany, four major units produce nore than 125,000 tonnes per year, whereas the Indian dyes-uffs industry enjoys the dubious distinction of having more han 900 units producing a meagre total of about 36,000 onnes of dyestuffs per annum!

An excessive pre-occupation with secrecy characterises this industry—encouraged, albeit indirectly, by Government pol-icies! Today, no industry expert can give you exact figures of production, capacity or export of dyes in terms of quantity, as no reliable data is available on the contribution of the small scale sector. Current published data places the dyestuffs industry's total value of production at Rs. 410 crores—yet finished dyestuffs in excess of an FOB value of Rs. 285 crores were exported in 1989-90. How much production is therefore going unreported, is anyone's guess.

On the one hand, the Government has notified the industry as hazardous and has acknowledged that manufacture of dyes can be dangerous under improper conditions or inadequate monitoring and that its effluents can be harmful to the environment, if not properly treated before discharge. On the other hand, the Government continues to promote and encourage manufacture of dyestuffs in the small scale sector, which cannot afford to invest in the large capital outlays required for ensuring operational safely and environmental protection. In fact, the list of items reserved for manufacture in the small scale sector includes several products, manufacture of which involves potentially hazardous processes which can only be safely undertaken by large units!

The industry is both capital and labour intensive. Dyestuffs manufacture being essentially a batch process is labour intensive. The employment generation capacity for the industry is substantial, both direct and indirect. For an estimated production of 29,000 tonnes of finished dyestuffs, direct employment is to the tune of 35,000 people and it is est-mated that the industry creates jobs for six persons indirectl for every person employed. The industry therefore generate employment to the tune of 2,10,000 people. In view of bein a hazardous industry capital costs are also fairly high.

It is an industry whose export performance in the last fou years has dazzled the country — yet the phenomenal growt figures trotted out (1053 % growth in value over the last fiv years; 32% growth in 1989-90 over the previous year, whic itself represented 88% growth over its previous year!) ca be quite misleading. The fact is that that the export perform-ance for 1989-90 fell short of the target of Rs.665 crore Further, India's share in world trade, as also per unit valu realisation, is decreasing. The story of indigo has bee repeated with H-Acid and unless concrete steps are take many more products will go the same way! More importan does the export performance do justice to the potential?

A few facts and figures

Capacity:

The country is absolutely self-sufficient in dyestuffs wit a current installed capacity of approximately 59,000 tonne (36,709 tonnes in the organised sector consisting of 48 unit and 21,675 tonnes estimated in the small scale sector encom-passing more than 900 units).

Production:

According to the Annual Report of the Department o Chemicals & Petrochemicals 26,200 tonnes of dyes was pro-duced by the organised sector in 1989-90. Add to this an esti-mated production of 10,000 tonnes by the small scale secto to give a total production of about 36,000 tonnes per annum More than 600 different dyestuffs are manufactured in th followings groups — direct dyes, acid dyes, basic dyes, sul-phur dyes, reactive dyes, disperse dyes, vat dyes, solubilise vat dyes, ingrain dyes and dope dyes, acrylic fibre dyes, meta complex dyes, pigment emulsions, naphthols, bases an organic pigments.

Demand:

According to the Perspective Plan for the Chemical Indus-try prepared by the Department of Chemicals and Petrochem cals, Government of India, the demand for dyestuffs (in onnes) is as follows:

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* Paper presented by the author at the International Conference on Chemicals & Pharmaceuticals, held at Hyderabad in July 1990

	Local		Exports		Total
1989-1990	40,065	+	8,000	=	48,065
1994-1995	49,980	+	11,000	=	60,980
1990-2000	61,110	+	13,000	=	74,110

xports/Imports:

Exports of dyestuffs began in 1960-61 with a meagre quanity of 16 tonnes valued at Rs.3.5 lakhs. In 1989-90 the indusry exported Rs. 529.80 crores and the target for the current ear is placed at Rs.800 crores. With regard to imports, India nce imported around 8000 tonnes of dyestuffs, a figure that teadily declined and at present only a few specialised classes f dyes worth around Rs.10 crores and amounting to 5% of otal dyestuffs consumed in the country are imported.

echnology:

The industry has successfully absorbed technology and has eached high levels of competence in the manufacture of dyesuffs. However, the degree of instrumentation and computerised process control is not comparable with that of echnologically advanced countries. The gaps in technology mainly exist in the areas of (a) filtration, (b) drying, (c) material handling, (d) automation, (e) risk analysis and hazard conrol, (f) pollution control.

It is unlikely that any new major fibre material will be invented in the near future. Newer speciality dyes, termed Functional Dyes, for new applications such as liquid crystal display devices, pressure and temperature sensitive materials, laser technology, information recording media, information display media, energy transfer and storage media, optical catalysts, infra-red absorbents, photochromic materials etc. are gaining ground. Newer dyes are also required for colour photography and for disazo processes.

Prospects for the industry:

It is not wholly true to state that the opportunities for export of dyes from India have arisen due to environmental problems in the West. There are still numerous world scale plants functioning both in the East and in the West and many large corporations have a commitment not to export pollution to other countries! There has been a selective closure of plants producing certain classes of dyestuffs due to a combination of several factors including economic viability.

The tendency now in the developed countries is to vacate low technology areas for high-tech, high-return industries and

nies have left the field in the last decade. In addition, the has been a lot of rationalisation of production, consequent creating a vaccum for certain groups of dyestuffs.

Simultaneously, the demand—specially for deep da shades—is booming and several developing countries hav no manufacturing facilities. The annual import bill of Vie nam on dyes and pigments is of the order of US$ 10,000,00 These imports meet less than 50% of the demand of dye us industries. Developments such as these have already provide the necessary boost to the Indian dyestuff industry which ha a sound foundation of technology and infrastructure, partic ularly in the organised sector.

However, it is this authors submission that given the righ policy prescriptions, a vast, as yet untapped potential exist for growth of the Indian dyestuffs industry. Currently, ou production represents less than 5% of world production o 800,000 tonnes per annum. Capacity will not be a limitin factor, as substantial capacity that has already been create is not yet fully utilised, and additional capacity, if warranted can be created even in the short term. Nor is technology want ing. The technology for the manufacture of all classes of dyes tuffs — which is neither highly sophisticated nor subject t too-rapid change — has been assimilated and India can draw on talent from the third largest pool of scientific and technical manpower. The raw material supply base is well developed and can be expanded to meet growing demands.

India therefore has all the essential pre-requisites to become a leading source of dyestuffs for the world, in the course of the eighth plan period. However, this can only be brought about if the Government works closely in concert with all the sectors in the industry to help solve specific problems and facilitate those policy changes that will enable the industry's fullest potential to be exploited.

Fiscal policy

Upto the late seventies, the dyestuffs industry had grown in a steady and orderly fashion. Suddenly, the introduction of an ill-conceived scheme of excise exemption/concession resulted in an overnight mushrooming of hundreds of small units, who entered the business solely to take advantage of excise concessions. Even today, the survival of these units depends entirely on the artificial respiration offered by excise exemptions/concessions, which, if withdrawn, would result in their immediate and complete collapse. Such a policy only encourages large scale evasion, resulting in loss of revenue to the Government while impeding the healthy growth of the organised duty-paying sector of the industry.

I accept that it would not be feasible to suddenly withmall scale units in this industry. However, it would be both ossible and desirable for the Government to reduce the xcessive burden of 30% excise duty on the organised sector n order to strengthen the domestic base of this industry. By ringing the excise rate down to 15%, the wide disparity etween the full duty paying and non-duty paying sectors vould be considerably reduced and would ultimately result n higher revenue collection as:-

i) it will encourage better tax compliance;
(ii) the buoyancy in operation of the large scale sector will ensure higher direct tax realisation;
(iii) most important, it will encourage small units to grow as there will be no attraction to remain small and will rid the industry of short term operators for whom this business will lose its erstwhile charm.

Apart from this over-riding change, it would be necessary to:-

(i) encourage investment in modernisation (most plant and machinery in the industry is largerly outdated) and in pollution control equipment through appropriate fiscal incentives;
(ii) allow imports of capital goods (or indigenous sourcing) with minimum duty;
(iii) allow 25% of all expenditure on R & D as a deduction from taxable income.

Industrial policy

The proposed increase in the limits of investment for small scale is welcome as it is likely to help genuine units in the industry to grow. However, in order to encourage them to invest adequately in setting up effluent treatment and pollution control facilities, it would be desirable to exempt such investments from inclusion in the limits for establishing their small scale status. In the interest of making the dyestufff industry truly internationally competitive the Government should go yet a step further. There is urgent need to closely re-examine the items currently reserved for the small scale sector. Only those items which can efficiently and safely be manufactured by small units should continue to be reserved for them. Items like phthalocyanine blue, cyanuric chloride based dyes and optical whitening agents— manufacture of which involves potentially hazardous processes or where direct handling must be avoided — should not be open to the small scale at all. Any item that can be more cheaply or safely produced by the large scale should not be closed to them. So vast is the production range covered by dyes and dye intermediates that there will still be several items which the small scale can produce effectively. Such a policy will enable the various sub-sectors in the industry to develop along mutually interdependant lines rather than to take adverserial stands.

The new Industrial Policy has promised that invesmer upto Rs. 25 crores in non-backward areas would not requi an industrial licence. Whether this liberalisation remains on on paper or is translated into reality remains to be seen. Simu taneously, clearances for all related permissions such as Env ronmental and Locational Clearance etc. should be expedit or the very spirit of this measure of liberalisation will be v iated.

Trade policy

While welcoming the several measures of import libera isation for the purpose of export production, I would like draw the attention of the Government to the rampant misu of the Advance Licence facility to import disperse dyes und the broad classification of "synthetic organic dyestuffs", b exporters of leather goods, garments, carpets, cotton textil and hosiery—when these dyes do not find any applicati in these export products. Disperse dyes can only be used f dyeing polyester and blended yarns and fabrics. Howeve the broad heading of "synthetic organic dyestuff" specifi on Advance Licences enables unscrupulous elements import disperse dyes duty-free and to dispose them off in th local market as replenished material. It is reported that a much as 150 tonnes of disperse dyes are being imported ever month, thereby severely crippling the demand for the ful duty paid indigenous products for which adequate produ tion capacity exists in India. The licensing authorities mig therefore take the added precaution to ensure that Advanc Licences issued to exporters clearly describe the class of dy allowed for import (which must be related to the export pr duct) and specify the maximum extent to which these ma be imported on the basis of the FOB value of the specif item exported. The Government may also consider the indu try's plea that disperse dyes be shifted to App. 2-P in ord to place it outside the purview of REP licences. The wid flexibility accorded to these licences in the current policy resulting in their large scale import in high concentratio at under-invoiced values by traders.

It is also my submission that while liberalising the Trac Policy will help meet the industry's need for raw materia in the short run, it is not a desirable and permanent solutio In the long run, it will be in the country's interest to sourc raw materials indigenously. India has a well developed ra material base and availability must be improved by direc ing investment into these areas during the coming years. W have the know-how, the man-power, and the natural resou ces. The only weakness is the high cost of these raw mate ials, mainly on account of high administered prices of buildir blocks and high indirect taxes. The solution therefore lies reducing these costs rather than relying progressively c mports. Even in the short term this can be done by making he Deemed Export Scheme more attractive.

Yet another area of concern is that despite all efforts, export procedures remain cumbersome, particularly those relating to the incentives of CCS and DBK. A detailed study of tax incidence suffered by the industry (covering all taxes whether direct or indirect, state or central) through all stages of manufacture to arrive at a weighted average of such incidence for the industry as a whole is called for. If this approximates say 25% of the FOB price, an equivalent amount should automatically be credited by the bank to the exporters account (in lieu of CCS and DBK) no sooner that proceeds for the concerned export are received by it. Such major simplification of procedures will go a long way to boosting exports.

Other recommendations

To guide its growth, a separate Development Council f Dyes and Dye-Intermediates should be established. Such Council would also be responsible for continuously collec ing and updating data pertaining to the industry, particular in the area of economic statistics, imports and exports. T coverage should be comprehensive, including all units in t small scale sector.

The corporate sector's expertise and international expe ience should be utilised through grant of specific represe tation to it on the Central and State (Prevention & Contr of Pollution) Boards.

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Chemistry of Synthetic Surfactants

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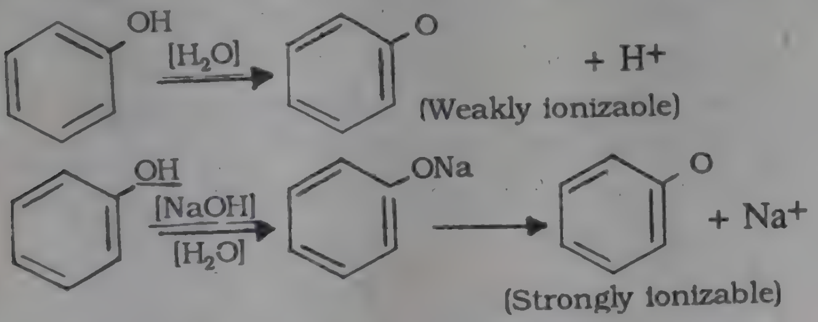
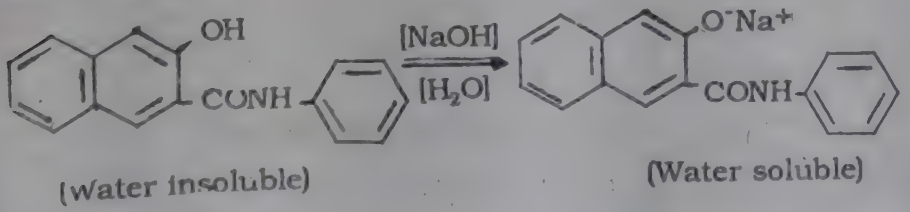
Surfactants may be broadly divided into two classes —ionic and nonionic. Ionic surfactants, in turn may be divided into three sub-classes — anionic, cationic and amphoteric. This classification is based on the presence or otherwise of ionic charge on a particular portion of the surfactant molecule.

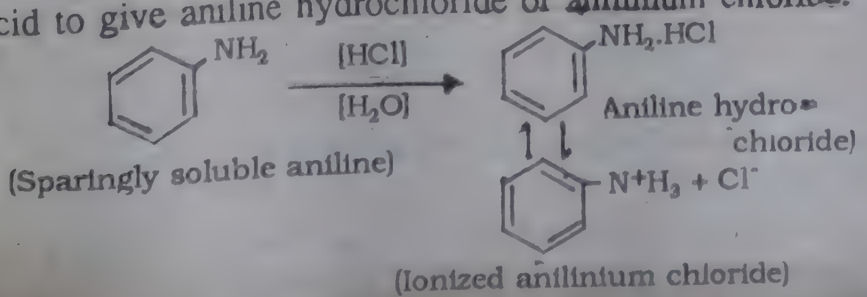
Water-soluble compounds dissolve in water by various mechanisms. Thus ionization of the molecules of the compound leads to water solubility. This implies that there must be ionizable hydrophilic groups like -COOH, -SO_3H, -OSO_3H, -O-P(O) $(OH)_2$ either in the free acid forms or as their alkali metal salt forms. In fact, their alkali metal salts ionize to a greater extent than the corresponding free acids. Thus even though phenol has a hydrophilic group (-OH) its ionizing capacity is so low that phenol is sparingly soluble in water. However, this weak acid can be neutralised with sodium hydroxide, the resulting salt, sodium phenolate, ionizes to a larger extent and hence it is highly soluble in water.



Similarly, whereas Naphtol AS (which is in the free acid form) is insoluble in water, its sodium salt is soluble in water and this principle is used in dissolution of the naphthol in azoic dyeing.



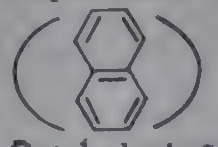
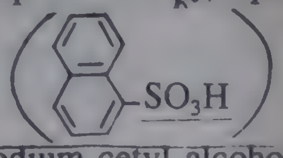
Acquisition of water solubility after salt formation can be seen in the case of aniline, (which is sparingly soluble in water) becomes more soluble after reacting with hydrochloric acid to give aniline hydrochloride or anilinium chloride.



This reaction is used in the production of aniline black cotton fabrics, when the water soluble salt form of anili is successively oxidized by sodium chlorate in the cataly presence of potassium ferrocyanide.

Anionic Surfactants

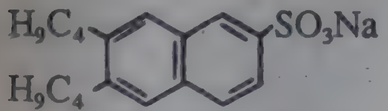
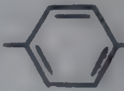
Organic compounds containing alkyl (methyl, ethyl lauryl, myristyl, cetyl, stearyl, ...), aryl (phenyl, naphth .....) and alkyl aryl (octyl phenyl, nonyl phenyl, dodec phenyl) groups acquire insolubility in water (or hydrophol city) to a greater or lesser extent and this generally depen on the number of carbon atoms present in them, higher t number, greater is the hydrophobicity. If hydrophilic grou are attached to these groups, the resulting compounds m acquire water solubility or still remain insoluble, which aga depends on the number of carbon atoms present in the hydr phobic portion of the entire molecule and the hydrophilici imparted by the water-solubilizing group attached. This evident in the following table:

Water insoluble	Water soluble
1. Ethane (C_2H_6)	1. Acetic acid (CH_3-COOH
2. Benzene (C_6H_6)	2. Benzoic acid (C_6H_5-COOH)
3. Octadecane ($C_{18}H_{38}$)	3. Stearyl sodium sulphona ($C_{18}H_{37}$-SO_3Na)
4. Stearic acid ($C_{17}H_{35}$-COOH)	4. Sodium Stearate ($C_{17}H_{35}$-COO Na)
5. Naphthalene 	5. Naphthalene α-sulphonic acid 
6. Cetyl alcohol ($C_{16}H_{33}OH$)	6. Sodium cetyl alcohol sulphate ($C_{16}H_{33}OSO_3Na$

In the case of lower hydrocarbons (like methane, ethan benzene, etc), the addition of a single carboxyl group mak the entire molecule go into solution. Thus formic, acetic ar benzoic acids are soluble in water. As the number of carbo atoms in the hydrocarbon portion increases (keeping only o carboxyl group), the water solubility is gradually decrease which can be seen in the fact that whereas acetic acid is free soluble in water, propionic acid is less soluble and butyr acid is very sparingly soluble in water and finally fatty aci like lauric (C_{12}), myristic (C_{14}), palmitic (C_{16}) and stear

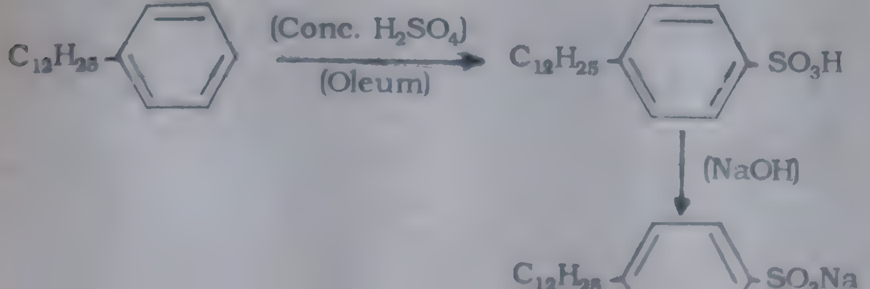
C_{18}) acids are all insoluble in water. However, when the ree carboxyl groups are neutralized with sodium hydroxide o give sodium carboxylate groups (which ionize very easily nd hence make the molecule soluble in water), the higher ydrophilicity of the ionized carboxylate group balances the ydrophobicity of the higher alkyl group. So the sodium salts f fatty acids (popularly known as soaps) like sodium salts f C_{12}, C_{14}, C_{16} and C_{18} aliphatic acids) have balanced water olubility and water insolubility, which is the basis of surace activity of these soaps. Thus, surface activity may be uilt in a molecule by selecting suitable hydrophobic and ydrophilic components. Generally, C_{12}-C_{18} aliphatic groups rovide the hydrophobic portion and sodium carboxylate, sulhate, sulphonate, phosphate etc. are selected for the hydrohilic portion. In all these cases, the long portion of the molecule acquires a negative charge (with a small cation emaining in the vicinity of the anionic charge to maintain lectrical neutrality) after ionizing in water. Therefore these re called anionic surfactants. An interesting aspect of these ompounds is that the hydrophobic portion must contain 2-18 carbon atoms, no matter how they are present.

Thus, all the following compounds are powerful surfacants:

1. $CH_3(CH_2)_{16}$-COONa
2. CH_3-$(CH_2)_{17}$-OSO_3Na
3. CH_3-$(CH_2)_{17}$-SO_3Na (long chain C_{18})
4. 
H_9C_4
H_9C_4
SO_3Na
(Two short chains and one aromatic, C_{18})
5. $CH_3(CH_2)_{11}$-  SO_3Na (One long chain and one aromatic, C_{18})

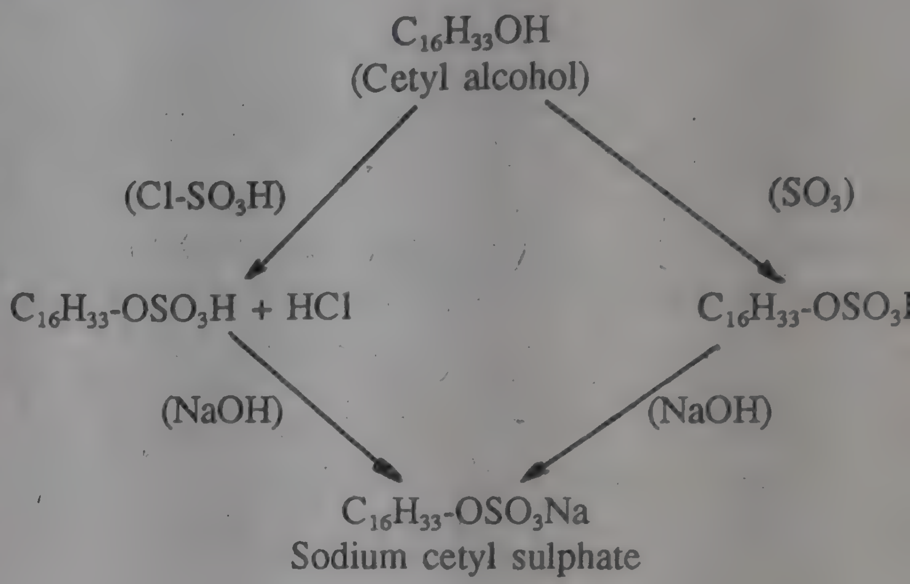
In compounds (3), (4) and (5), the hydrophobic portion contains 18 carbon atoms linked in different ways. All these have the same hydrophilic group (sodium sulphonate) and all are powerful anionic surfactants.

These are generally made by sulphonating alkyl aryl hydrocarbons (e.g. dodecyl benzene) with concentrated sulphuric acid with or without oleum, followed by washing the excess of sulphuric acid and by neutralizing the resulting sulphonic acid with sodium hydroxide.


$C_{12}H_{25}$
(Conc. H_2SO_4)
(Oleum)
$C_{12}H_{25}$
SO_3H
(NaOH)
$C_{12}H_{25}$
SO_3Na

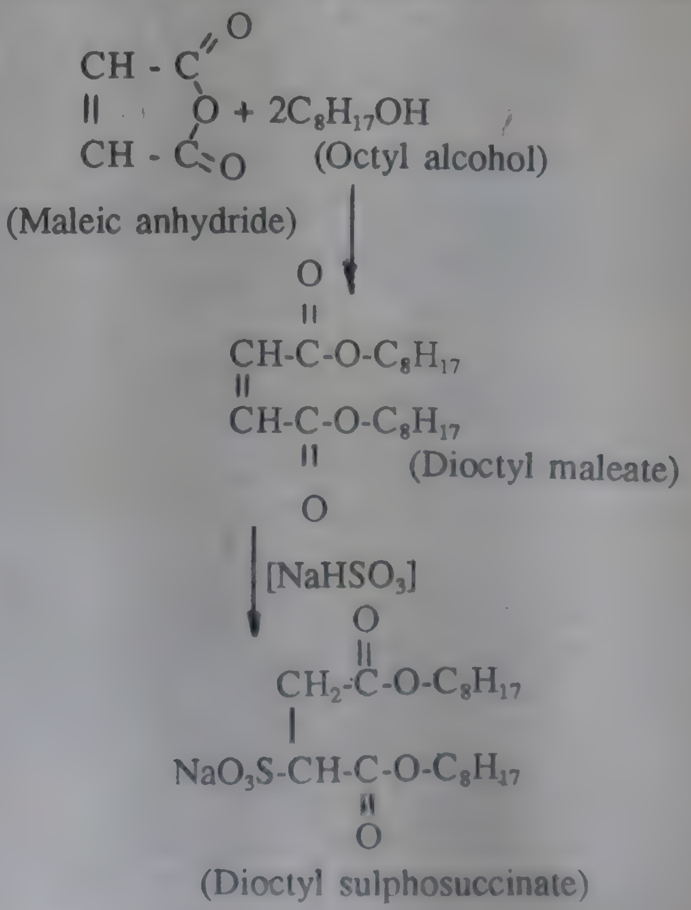
This is the most widely used anionic surfactant.

Fatty alcohols are sulphated by using chlorosulphonic ac (or by using gaseous sulphur trioxide) and then neutralise with sodium hydroxide:


$C_{16}H_{33}OH$
(Cetyl alcohol)
(Cl-SO_3H)
(SO_3)
$C_{16}H_{33}$-OSO_3H + HCl
$C_{16}H_{33}$-OSO_3
(NaOH)
(NaOH)
$C_{16}H_{33}$-OSO_3Na
Sodium cetyl sulphate

Sodium lauryl sulphate (SLS), also called sodium dodecyl sulphate (SDS), sodium myristyl sulphate, sodium stearyl sulphate, sodium oleyl sulphate etc. are made by these methods.

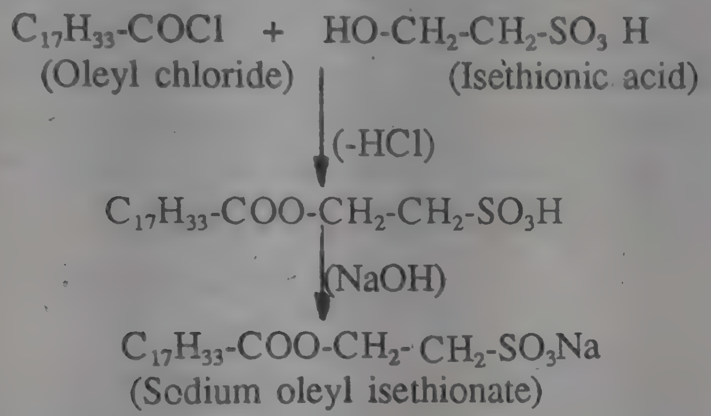
In another method of sulphonation a, concentrated aqueous solution of sodium bisulphite ($NaHSO_3$) is used as the sulphonating agent, provided there is unsaturation in the compound to be sulphonated. Thus dioctyl maleate, made by esterification of maleic anhydride with octyl alcohol (i.e., 2-ethyl hexanol) can be sulphonated in this manner:


CH - C
O
CH - C
O
O
+ $2C_8H_{17}OH$
(Octyl alcohol)
(Maleic anhydride)
CH-C-O-C_8H_{17}
CH-C-O-C_8H_{17}
(Dioctyl maleate)
[$NaHSO_3$]
CH_2-C-O-C_8H_{17}
NaO_3S-CH-C-O-C_8H_{17}
(Dioctyl sulphosuccinate)

This gives the most powerful wetting agent (also called e used under alkaline conditions, since, the ester gets hydro-zed (and loses its surface activity) under these conditions. : is best used under neutral conditions.

Some other anionic surfactants are made by different nethods:

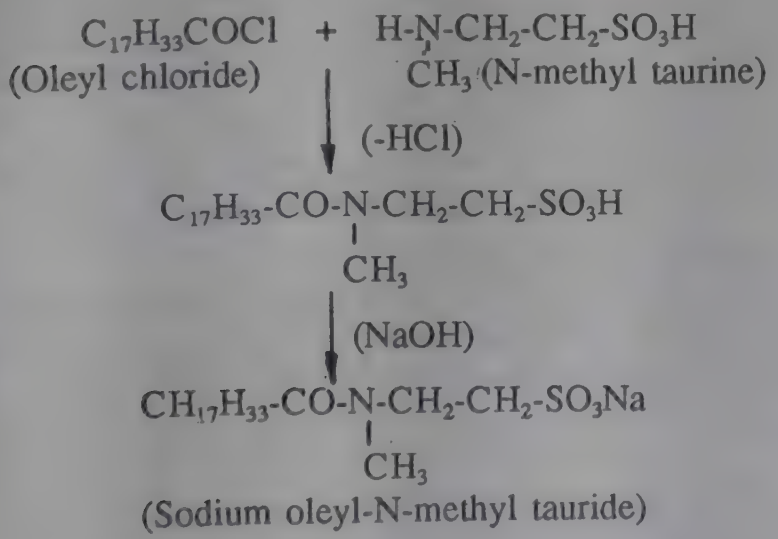
1. Fatty acid ester sulphonates are made by condensing atty acid chlorides with hydroxyethyl sulphonic acid (isethonic acid), followed by neutralization with sodium hylroxide:



$$\begin{array}{c} C_{17}H_{33}\text{-}COCl \quad + \quad HO\text{-}CH_2\text{-}CH_2\text{-}SO_3\,H \\ \text{(Oleyl chloride)} \qquad \text{(Isethionic acid)} \\ \downarrow\text{(-HCl)} \\ C_{17}H_{33}\text{-}COO\text{-}CH_2\text{-}CH_2\text{-}SO_3H \\ \downarrow\text{(NaOH)} \\ C_{17}H_{33}\text{-}COO\text{-}CH_2\text{-}CH_2\text{-}SO_3Na \end{array}$$

(Sodium oleyl isethionate)

2. Fatty acid amide sulphonates are made by condensing oleyl chloride with N-methyl taurine (N-methyl-N-ethyl sulphonic acid) followed by neutralizing with sodium hydroxide. The resulting compound, oleyl-N-methyl tauride (Na salt) has powerful detergent properties:

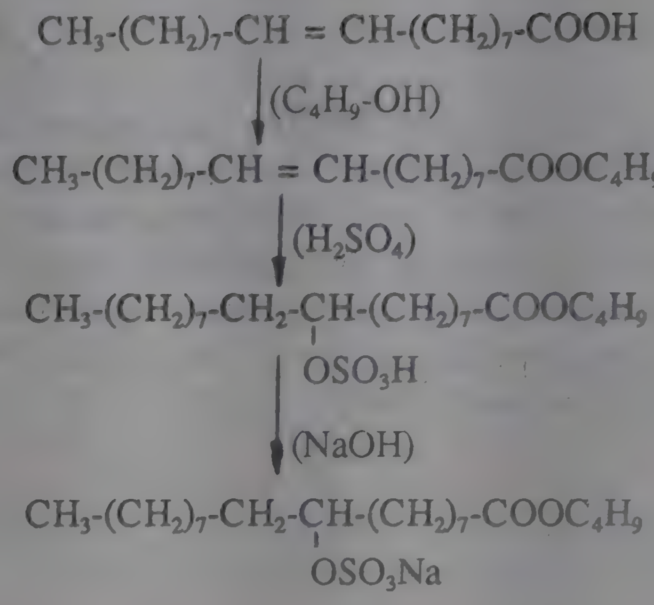


$$\begin{array}{c} C_{17}H_{33}COCl \quad + \quad H\text{-}\underset{CH_3}{N}\text{-}CH_2\text{-}CH_2\text{-}SO_3H \\ \text{(Oleyl chloride)} \qquad \text{(N-methyl taurine)} \\ \downarrow\text{(-HCl)} \\ C_{17}H_{33}\text{-}CO\text{-}\underset{CH_3}{N}\text{-}CH_2\text{-}CH_2\text{-}SO_3H \\ \downarrow\text{(NaOH)} \\ CH_{17}H_{33}\text{-}CO\text{-}\underset{CH_3}{N}\text{-}CH_2\text{-}CH_2\text{-}SO_3Na \end{array}$$

(Sodium oleyl-N-methyl tauride)

In all the anionic surfatants described above, the hydrophilic group (water solubilizing group) is at one end of the molecule. This is not a necessary condition i.e. the position of the hydrophilic group is immaterial as long as it is present somewhere in the molecule. This is illustrated in the next example.

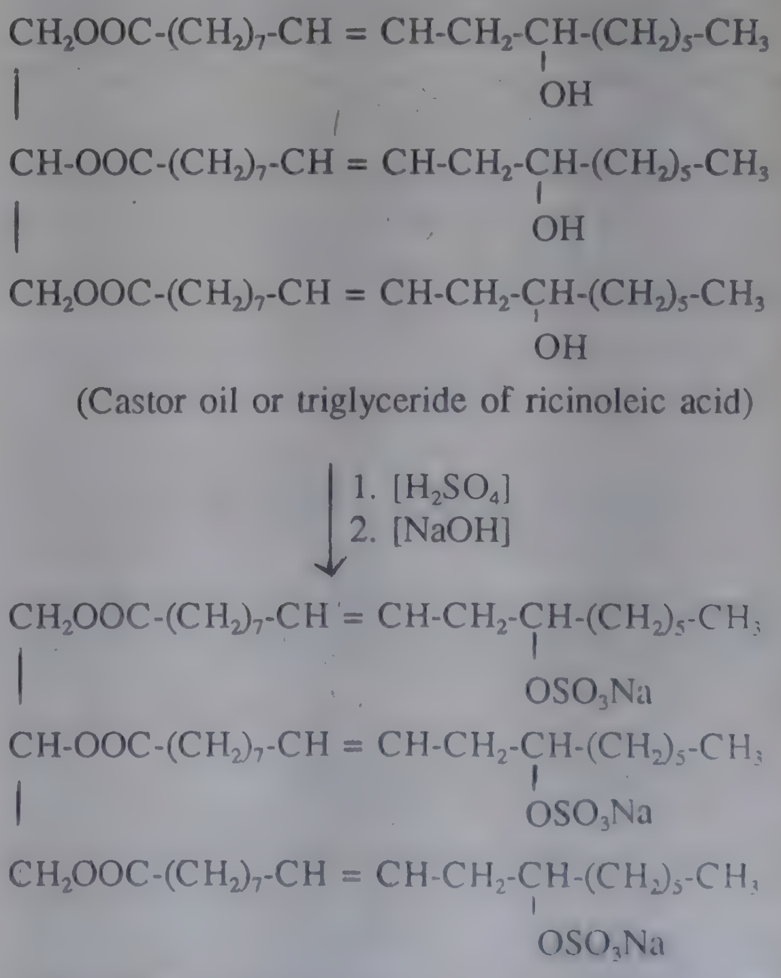
3. Fatty acid ester sulphates are made by esterifying an unsaturated fatty acid (usually oleic acid) and sulphating at the unsaturation. Thus, sulphated butyl oleate is made by butylating and sulphating oleic acid, followed by neutralizing under controlled conditions of temperature, so that the ester group is not hydrolyzed by the alkali.



$$\begin{array}{c} CH_3\text{-}(CH_2)_7\text{-}CH = CH\text{-}(CH_2)_7\text{-}COOH \\ \downarrow(C_4H_9\text{-}OH) \\ CH_3\text{-}(CH_2)_7\text{-}CH = CH\text{-}(CH_2)_7\text{-}COOC_4H_9 \\ \downarrow(H_2SO_4) \\ CH_3\text{-}(CH_2)_7\text{-}CH_2\text{-}\underset{OSO_3H}{CH}\text{-}(CH_2)_7\text{-}COOC_4H_9 \\ \downarrow(NaOH) \\ CH_3\text{-}(CH_2)_7\text{-}CH_2\text{-}\underset{OSO_3Na}{CH}\text{-}(CH_2)_7\text{-}COOC_4H_9 \end{array}$$

If the sulphated ester gets hydrolyzed under alkaline co ditions, the product would contain two solubilizing grou (-OSO_3Na and -COONa), which would upset the balance water solubility and insolubility of the compound, whic would lose its surface activity. Hence it is essential to retai the ester group intact.

4. Anionic surfatants with the hydrophilic group in th interior of the molecule (in contrast to that at the end of th molecule) can be made by sulphating a hydroxy group containing fatty acid (like ricinoleic acid) or its triglycerid (the well known castor oil to prepare Turkey Red Oil) followed by neutralization, again under the controlled conditions of temperature to avoid the hydrolysis of the este (glyceride) group:



$$\begin{array}{l} CH_2OOC\text{-}(CH_2)_7\text{-}CH = CH\text{-}CH_2\text{-}\underset{OH}{CH}\text{-}(CH_2)_5\text{-}CH_3 \\ | \\ CH\text{-}OOC\text{-}(CH_2)_7\text{-}CH = CH\text{-}CH_2\text{-}\underset{OH}{CH}\text{-}(CH_2)_5\text{-}CH_3 \\ | \\ CH_2OOC\text{-}(CH_2)_7\text{-}CH = CH\text{-}CH_2\text{-}\underset{OH}{CH}\text{-}(CH_2)_5\text{-}CH_3 \end{array}$$

(Castor oil or triglyceride of ricinoleic acid)

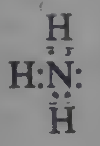
$$\downarrow \begin{array}{l} 1.\ [H_2SO_4] \\ 2.\ [NaOH] \end{array}$$

$$\begin{array}{l} CH_2OOC\text{-}(CH_2)_7\text{-}CH = CH\text{-}CH_2\text{-}\underset{OSO_3Na}{CH}\text{-}(CH_2)_5\text{-}CH_3 \\ | \\ CH\text{-}OOC\text{-}(CH_2)_7\text{-}CH = CH\text{-}CH_2\text{-}\underset{OSO_3Na}{CH}\text{-}(CH_2)_5\text{-}CH_3 \\ | \\ CH_2OOC\text{-}(CH_2)_7\text{-}CH = CH\text{-}CH_2\text{-}\underset{OSO_3Na}{CH}\text{-}(CH_2)_5\text{-}CH_3 \end{array}$$

(One of the many components of Turkey Red Oil)

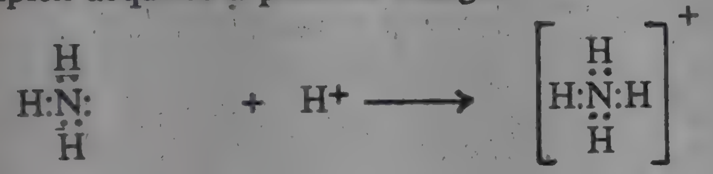
Cationic Surfactants

Ammonia (NH_3) provides the base for a vast multitude of cationic surfactants; in fact all of them may be considered as substituted ammonia, with certain other reactions carried out on them. In ammonia, there are three covalent bonds between nitrogen and the three hydrogen atoms, the nitrogen atom having an unshared pair of electrons, the entire molecule being electrically neutral:



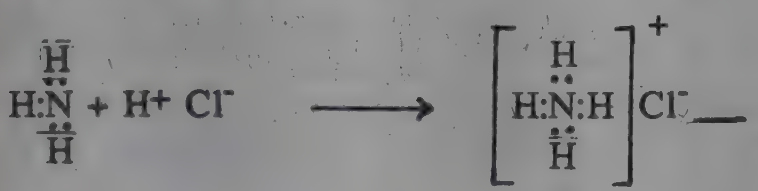
$$\begin{array}{c}H\\ H:\ddot{N}:\\ H\end{array}$$

The lone pair of electrons can be shared by the nitrogen atom and a proton (when the nitrogen atom gets protonated) and the complex acquires a positive charge:



$$\begin{array}{c}H\\ H:\ddot{N}:\\ H\end{array} + H^+ \longrightarrow \left[\begin{array}{c}H\\ H:\ddot{N}:H\\ H\end{array}\right]^+$$

The proton may come from an ionized acid, when there will be a counter ion of negative charge



$$\begin{array}{c}H\\ H:N\\ H\end{array} + H^+\,Cl^- \longrightarrow \left[\begin{array}{c}H\\ H:\ddot{N}:H\\ H\end{array}\right]^+ Cl^-$$

In simple terms, ammonia gas reacts with hydrochloric acid, forming ammonium chloride which, in aqueous solution, ionizes into ammonium cation and chloride anion, both remaining in the vicinity of each other. In the solid form, both the ions are held by the strong electrovalent bond. This bond breaks on heating solid ammonium chloride, which dissociates into gaseous products — ammonia and hydrogen chloride and in water it ionizes:

$$NH_4Cl \xrightarrow{\text{(Heat)}} NH_3 + HCl$$

$$NH_4Cl \xrightarrow{(H_2O)} NH_4^+ + Cl^-$$

The hydrogen atoms attached to nitrogen atom can be successively replaced by an alkyl group (either long chain or a short chain):

$NH_3 + CH_3\,Cl \longrightarrow CH_3\text{-}NH_2$
(Methylamine)

$CH_3\text{-}NH_2 + CH_3\,Cl \longrightarrow (CH_3)_2NH$
(Dimethylamine)

$(CH_3)_2NH + CH_3\text{-}Cl \longrightarrow (CH_3)_3N$
(Trimethylamine)

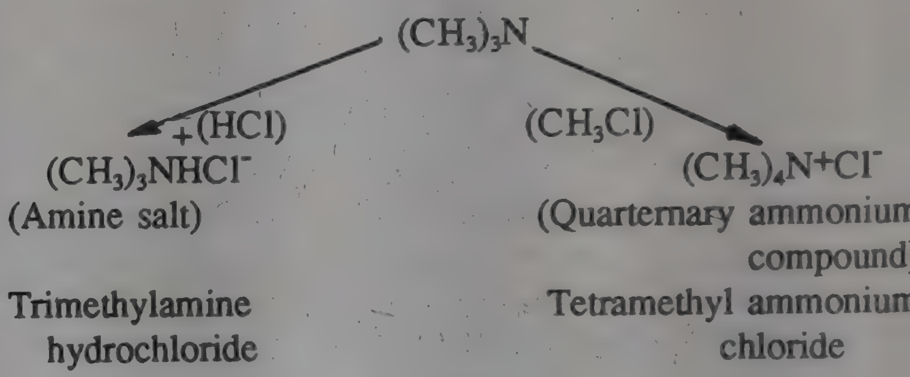
reactions can form the corresponding salts by reacting with hydrochloric acid:

$$CH_3\text{-}NH_2 + HCl \xrightarrow{(H_2O)} CH_3\overset{+}{N}H_3Cl^-$$

$$(CH_3)_2\text{-}NH + HCl \xrightarrow{(H_2O)} (CH_3)_2\overset{+}{N}H_2Cl^-$$

$$(CH_3)_3\text{-}N + HCl \xrightarrow{(H_2O)} (CH_3)_3\overset{+}{N}H\ Cl^-$$

In all the above resulting salts there is atleast one hydrogen atom attached to the nitrogen atom. Such compounds are called amine salts. On the other hand if the last hydrogen atom is also replaced by an alkyl group (when the nitrogen is attached to four carbon atoms) the resulting compound is known as a quarternary ammonium compound. Thus the difference between amine salts and quarternary ammonium compounds should be clearly understood:


$(CH_3)_3N$
(HCl)
(CH$_3$Cl)
$(CH_3)_3\overset{+}{N}HCl^-$
(Amine salt)
Trimethylamine hydrochloride
$(CH_3)_4N^+Cl^-$
(Quarternary ammonium compound)
Tetramethyl ammonium chloride

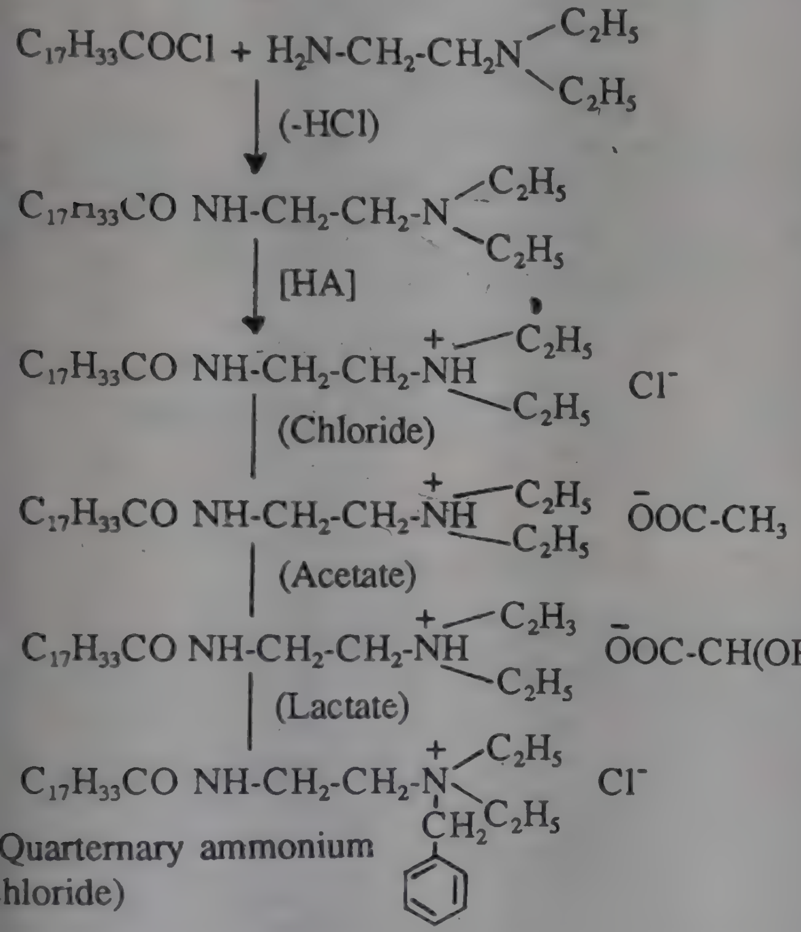
The ionizing power of $R_4N^+Cl^-$ or $R_3N^+HCl^-$ imparts strong hydrophilicity to the compound. If one long chain alkyl group (say, C_{12}, C_{14}, C_{16} or C_{18} alkyl) and three short alkyl groups (generally methyl and occasionally ethyl but not higher alkyl) are attached to the nitrogen atom, the anion being chloride, bromide, iodide or methosulphate, the resulting quarternary ammonium compound acquires balanced water insolubility and solubility; in other words, it acquires surface activity. Since the positive charge is present on the long chain portion of the molecule, it becomes a cationic surfactant.

As in the case of anionic surfactants, aliphatic chains containing 12 to 18 carbon atoms provide the necessary hydrophobicity and a halide ion or protonated nitrogen atom (ionizing site) provides the hydrophilicity. Thus, a group of cationic surfactants may be represented by the general formula

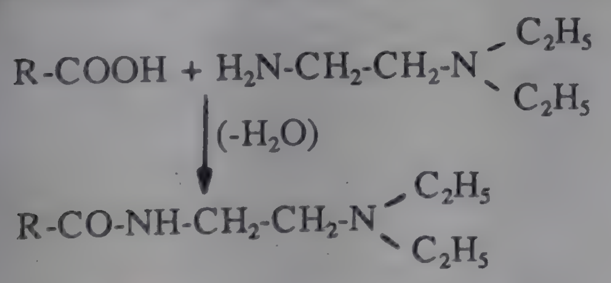
$$R\text{-}N^+R'_3,\ X^-$$

where R is C_{12}-C_{18} aliphatic chain, R' is either methyl or ethyl and X is halide. If R is selected from lauryl, myristyl cetyl, stearyl and oleyl, R' from methyl and ethyl and X is from chloride, bromide and iodide there would be 5 x 2 x 3 (= 30) cationic surfaftants of the above formula. Any of these thirty surfactants may be used for a particular purpose, though oms in the long chain aliphatic group. Thus, stearyl tri- ethyl ammonium chloride and lauryl trimethyl ammonium loride can be used as softening agents, though the former a slightly better softener. Other types of cationic softeners e made as folows:

(1) A fatty acid chloride is condensed with alkylene dia- ine to form an amino amide and amine salts are prepared y using different acids or a quarternary ammonium com- ound is prepared by reacting with benzyl chloride


C₁₇H₃₃COCl + H₂N-CH₂-CH₂N(C₂H₅)₂
(-HCl)
C₁₇H₃₃CO NH-CH₂-CH₂-N(C₂H₅)₂
[HA]
C₁₇H₃₃CO NH-CH₂-CH₂-NH⁺(C₂H₅)₂ Cl⁻
(Chloride)
C₁₇H₃₃CO NH-CH₂-CH₂-NH⁺(C₂H₅)₂ ⁻OOC-CH₃
(Acetate)
C₁₇H₃₃CO NH-CH₂-CH₂-NH⁺(C₂H₃)(C₂H₅) ⁻OOC-CH(OH)CH₃
(Lactate)
C₁₇H₃₃CO NH-CH₂-CH₂-N⁺(C₂H₅)(C₂H₅)CH₂ Cl⁻
Quarternary ammonium
hloride)

These compounds may also be made by reacting a fatty cid with the alkylene diamine:


R-COOH + H₂N-CH₂-CH₂-N(C₂H₅)₂
(-H₂O)
R-CO-NH-CH₂-CH₂-N(C₂H₅)₂

n this case, either glacial acetic acid or hydrochloric acid, s used to form the amine salt.

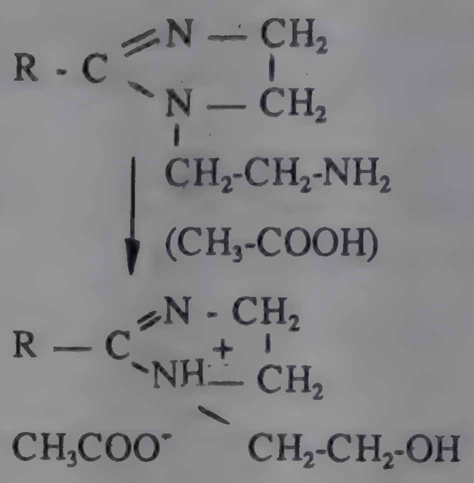
(2) Imidazolines are the next group of cationic softeners. n this case, a fatty acid is condensed with polyalkylene pol- yamine, followed by cyclizing by heating, and by neutralizing:

$$\mathrm{R\text{-}COOH + H_2N\text{-}CH_2\text{-}CH_2\text{-}NH\text{-}CH_2\text{-}CH_2\text{-}NH_2}$$

$\downarrow$ (Diethylene triamine)

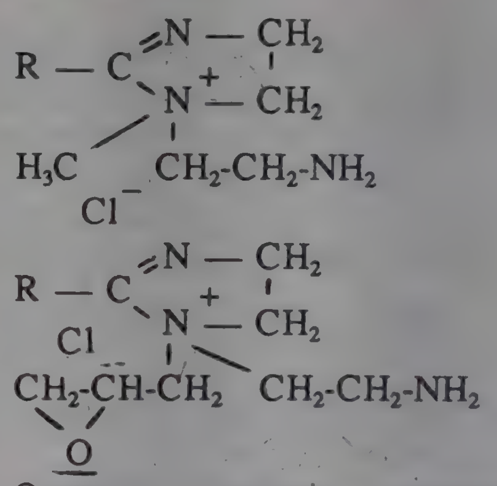
$$\mathrm{R\text{-}CO\text{-}NH\text{-}CH_2\text{-}CH_2\text{-}NH\text{-}CH_2\text{-}CH_2\text{-}NH_2}$$

$\downarrow$ (Heating)


R - C
N — CH₂
N — CH₂
CH₂-CH₂-NH₂
(CH₃-COOH)
R — C
N - CH₂
NH⁺ — CH₂
CH₃COO⁻
CH₂-CH₂-OH

The cyclic compound (imidazoline) has a lower melting poin and higher solubility than the parent linear amidoamine.

Instead of forming the amine salt (treatment with acetic acid), the corresponding quaternary ammonium compounds may be made by treatment with either methyl chloride or epichlorohydrin:


R — C
N — CH₂
N⁺ — CH₂
H₃C
CH₂-CH₂-NH₂
Cl⁻
R — C
N — CH₂
N⁺ — CH₂
Cl
CH₂-CH-CH₂
CH₂-CH₂-NH₂
O

Quaternary ammonium compounds of the type, R - N $(CH_3)_3Cl$, where R is a long chain alkyl group, can be made by two routes:

(a) Exhaustive alkylation of a primary or a secondary amine, as in the case of cetyl amine:

$$C_{16}H_{33}\text{-}NH_2 + 2CH_3Cl \longrightarrow C_{16}H_{33}N(CH_3)_2 + 2HCl$$

$$C_{16}H_{33}\text{-}N(CH_3)_2 + CH_3Cl \longrightarrow C_{16}H_{33}\overset{+}{N}(CH_3)_3Cl^-$$

In this case hydrogen chloride is formed as a byproduct (in the first reaction) and hence the reaction does not proceed to completion in an acidic medium. In order to counter this, a scavenger for the acid should be used. Industrially, sodium carbonate or potassium carbonate is used for the purpose in a polar solvent like methanol or water at 60°-95°C under slight pressure.

(b) Alkylation of low molecular weight tertiary amine with an alkyl chloride:

$$C_{16}H_{33}Cl + N(CH_3)_3 \longrightarrow C_{16}H_{33}\text{-}N^+(CH_3)_3\ Cl^-$$

The alkyl chloride may be made by converting a fatty alcohol by reaction with hydrogen chloride in the presence of zinc chloride catalyst. Alternatively, other chlorinating agents, like thionyl chloride, phosphorus trichloride or pentachloride, may be used:

$$R\text{-}CH_2OH \xrightarrow[{[ZnCl_2]}]{[HCl]} R\text{-}CH_2\text{-}Cl + H_2O$$

$$R\text{-}CH_2\text{-}OH \xrightarrow{[PCl_5]} R\text{-}CH_2\text{-}Cl + POCl_3 + HCl$$

The resulting alkyl halide may be reacted with dimethylamine in the presence of an alkali:

$$\begin{array}{l} C_{16}H_{33}Cl + HN\,(CH_3)_2 \\ \quad \downarrow [NaOH] \\ C_{16}H_{33}\text{-}N(CH_3)_2 \end{array}$$

In a modification, the fatty alcohol may be directly reacted with dimethylamine at high temperature and under high pressure:

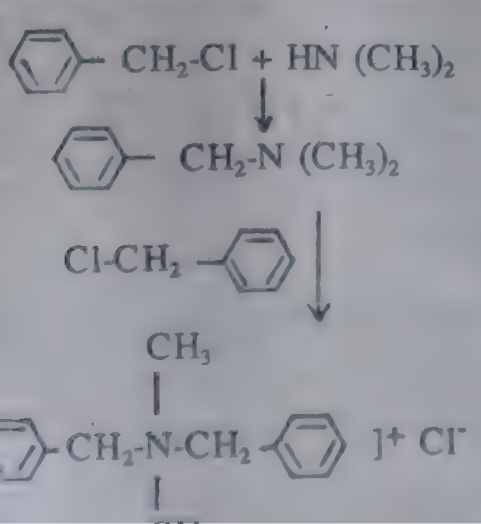
$$\begin{array}{l} C_{16}H_{33}\text{-}OH + HN(CH_3)_2 \\ \quad \downarrow \\ C_{16}H_{33}\text{-}N(CH_3)_2 + H_2O \end{array}$$

The tertiary amine thus formed may further be quaternized using methyl chloride or dimethyl sulphate:

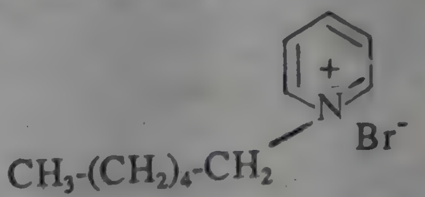
$$\begin{array}{l} C_{16}H_{33}\text{-}N(CH_3)_2 + CH_3Cl \\ \quad \downarrow \\ C_{16}H_{33}\text{-}N^{+}(CH_3)_3Cl^{-} \end{array}$$

$$\begin{array}{l} C_{16}H_{33}\text{-}N(CH_3)_2 + (CH_3)_2\,SO_4 \\ \quad \downarrow \\ C_{16}H_{33}\text{-}N^{+}(CH_3)_3\,.\,SO_4CH_3^{-} \end{array}$$

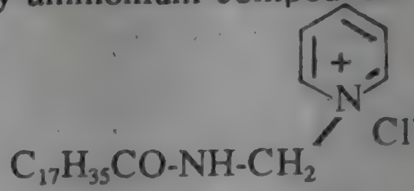
In another method, dibenzyl dimethyl ammonium chloride can be made by condensing dimethylamine with benzyl chloride, followed by quaternizing with benzyl chloride.


CH₂-Cl + HN (CH₃)₂
CH₂-N (CH₃)₂
Cl-CH₂
CH₃
[CH₂-N-CH₂]⁺ Cl⁻

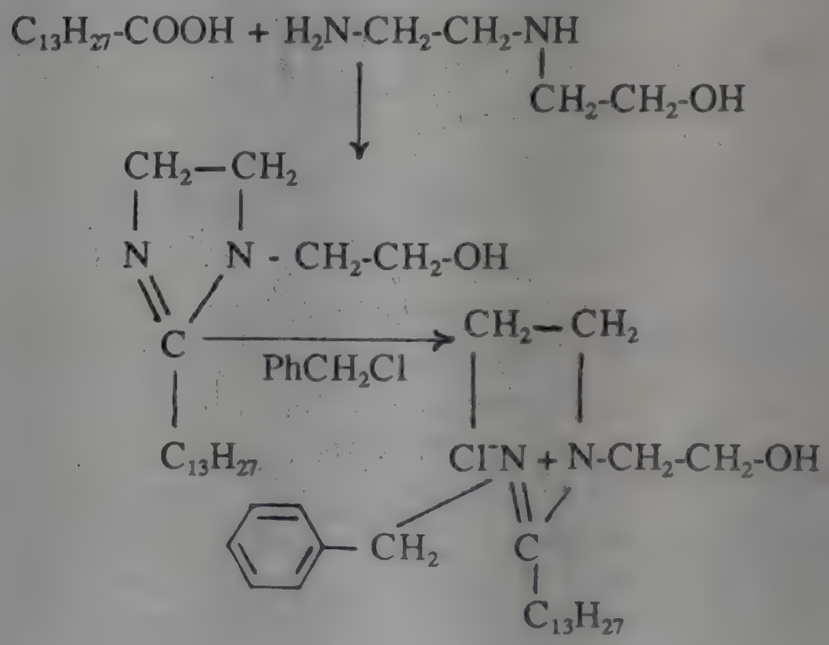
Heterocyclic groups may also be found in quaternary ammonium compounds. Cetyl pyridinium bromide is such an example


+
N
Br⁻
CH₃-(CH₂)₄-CH₂

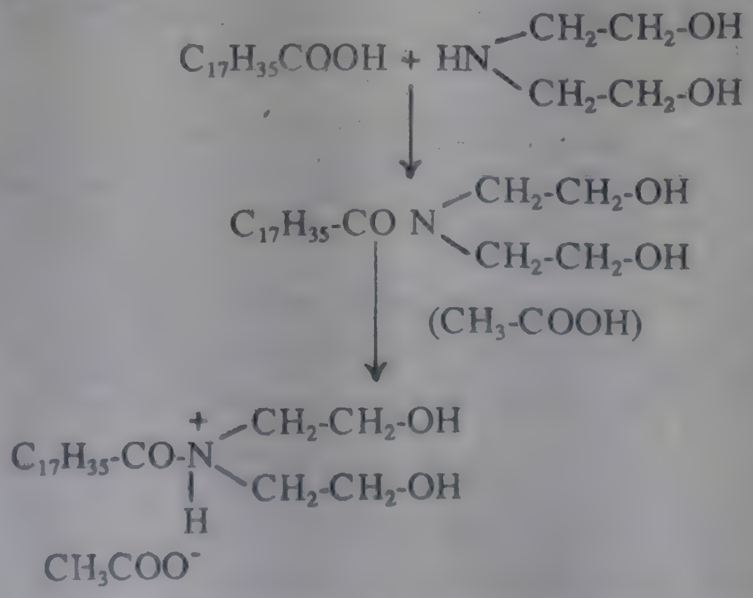
Stearamido methyl pyridinium chloride belongs to this group of quaternary ammonium compounds:


+
N
Cl⁻
C₁₇H₃₅CO-NH-CH₂

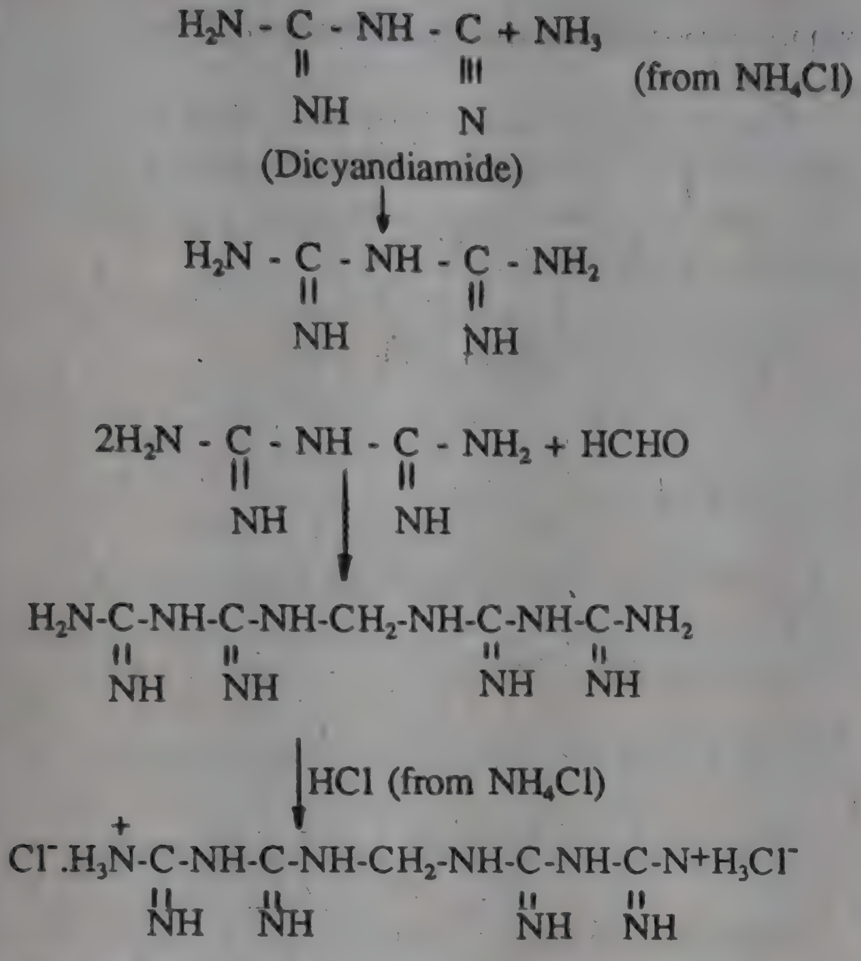
Imidazolinium (cyclic) derivatives can be made by condensing a fatty acid with 2-aminoethyl ethanolamine and then quaternizing with alkyl or aryl halide. Tridecyl benzyl hydroxyethyl imidazolinium chloride is such a compound


C₁₃H₂₇-COOH + H₂N-CH₂-CH₂-NH
CH₂-CH₂-OH
CH₂—CH₂
N
N - CH₂-CH₂-OH
C
C₁₃H₂₇
PhCH₂Cl
CH₂—CH₂
Cl⁻N + N-CH₂-CH₂-OH
CH₂
C
C₁₃H₂₇

Alkylolamide salts may be made by condensing a fatty acid with alkanolamines followed by salt formation. Thus stearic acid may be condensed with diethanolamine and treated with acetic acid:


C₁₇H₃₅COOH + HN
CH₂-CH₂-OH
CH₂-CH₂-OH
C₁₇H₃₅-CO N
CH₂-CH₂-OH
CH₂-CH₂-OH
(CH₃-COOH)
C₁₇H₃₅-CO-N
+
CH₂-CH₂-OH
CH₂-CH₂-OH
H
CH₃COO⁻

Another commercially important cationic compound i made by condensing dicyandiamide with formaldehyde in th



$$H_2N-\underset{\underset{NH}{\|}}{C}-NH-\underset{\underset{N}{|||}}{C}+NH_3 \quad (\text{from } NH_4Cl)$$

(Dicyandiamide)

$$\downarrow$$

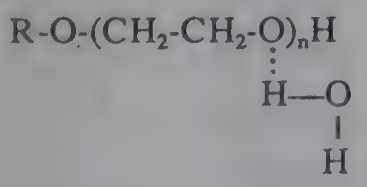
$$H_2N-\underset{\underset{NH}{\|}}{C}-NH-\underset{\underset{NH}{\|}}{C}-NH_2$$

$$2H_2N-\underset{\underset{NH}{\|}}{C}-NH-\underset{\underset{NH}{\|}}{C}-NH_2+HCHO \longrightarrow H_2N-\underset{\underset{NH}{\|}}{C}-NH-\underset{\underset{NH}{\|}}{C}-NH-CH_2-NH-\underset{\underset{NH}{\|}}{C}-NH-\underset{\underset{NH}{\|}}{C}-NH_2$$

$$\xrightarrow{HCl\ (\text{from } NH_4Cl)} Cl^-.\overset{+}{H_3N}-\underset{\underset{NH}{\|}}{C}-NH-\underset{\underset{NH}{\|}}{C}-NH-CH_2-NH-\underset{\underset{NH}{\|}}{C}-NH-\underset{\underset{NH}{\|}}{C}-N^+H_3Cl^-$$

onionic Surfactants

In these surfactants also there are hydrophobic and hydro-hilic portions in their molecules to provide the right hydro-hilic lyophilic balance or balanced water solubility and water nsolubility. The hydrophobic portion is generally provided y C_{12}-C_{18} aliphatic or alkylaryl group and the hydrophilic roup is taken from a number of oxyalkylene groups, which re generally oxyethylene groups and occasionally oxypro-ylene groups. These are introduced by reacting ethylene xide or propylene oxide with long chain compounds con-aining at least one active hydrogen atom. The resulting com-ound does not have any ionizable (water solubilizing) group n its molecular structure. Hence these are known as noni-nic compounds. These have centres of hydration (oxygen tom of the oxyethylene group). These centres form hydro-gen bonds with the hydrogen atom of water:

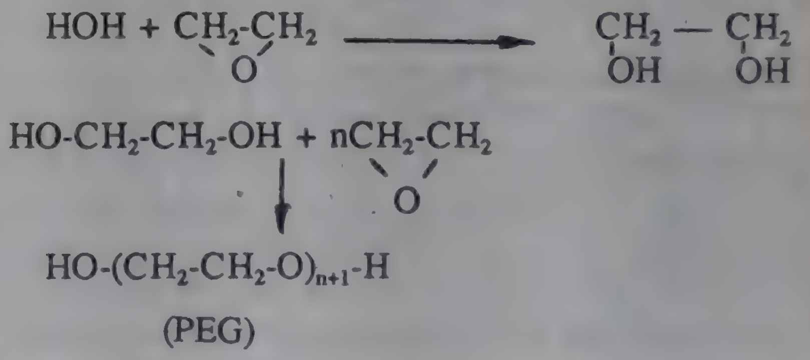


$$R-O-(CH_2-CH_2-\underset{\underset{H-\underset{\underset{H}{|}}{O}}{\vdots}}{O})_nH$$

When many water molecules are thus attached to a molecule of the nonionic compound, the molecule is freed from the cohesive forces exerted on it by its adjacent molecules. As a result, the compound goes into solution. Thus, these compounds produce clear solutions in water at the room temperature. When the solution is heated gradually, the thermal energy suppplied to it breaks the hydrogen bonds existing between the water molecules and the oxygen of the oxyethylene group and at a particular temperature (called the cloud [illegible] existing hydrogen bonds are broken and the nonionic molecule loses its aqueous solubility and the solution becomes cloudy. On cooling, however, the hydroge bonds are re-formed and the compound goes into solutio producing a clear solution. As the number of oxyethylen units present in the nonionic compound increases, while th hydrophobic chain remains the same, the cloud point increases (since more hydrogen bonds have to be broken and thi is done by supplying more thermal energy by raising the temperature). When the number of oxyethylene units is sufficiently large, the solution of the nonionic compound remain clear even at 100°C.

When the proper hydrophilic-lyophilic balance is maintained in the nonionic compound, we get nonionic surfactants For a given hydrophobic group, the cloud point of a nonionic surfactant containing this groups gives an idea abou the number of oxyethylene units present in it.

Ethylene oxide reacts with water to give ethylene glycol. On further addition of ethylene oxide molecules, polyethylene glycols (which are miscible with water and are not surfactants, since they contain only hydrophilic groups and no hydrophobic groups) are formed. Various grades of polyethylene glycols (PEG) are made, depending on the molecular weight of the final compounds. Thus, PEG-200, PEG-400, PEG-600, PEG-800, PEG-1000 etc. have molecular weights of 200, 400, 600, 800, 1000, etc. respectively.

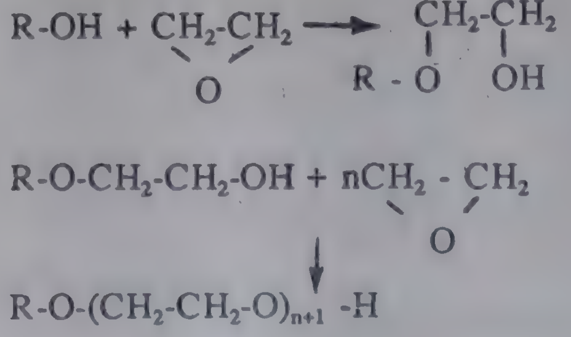


$$HOH + \underset{\diagdown O \diagup}{CH_2-CH_2} \longrightarrow \underset{OH}{\underset{|}{CH_2}}-\underset{OH}{\underset{|}{CH_2}}$$

$$HO-CH_2-CH_2-OH + n\underset{\diagdown O \diagup}{CH_2-CH_2} \longrightarrow HO-(CH_2-CH_2-O)_{n+1}-H$$

(PEG)

Similarly, ethylene oxide reacts with alcohols to give ethers:

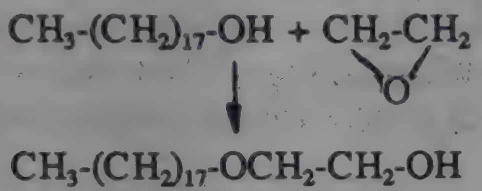


$$R-OH + \underset{\diagdown O \diagup}{CH_2-CH_2} \longrightarrow \underset{R-O}{\underset{|}{CH_2}}-\underset{OH}{\underset{|}{CH_2}}$$

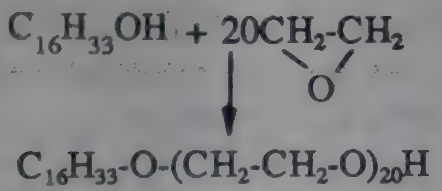
$$R-O-CH_2-CH_2-OH + n\underset{\diagdown O \diagup}{CH_2-CH_2} \longrightarrow R-O-(CH_2-CH_2-O)_{n+1}-H$$

The reaction is called polyoxyethylation and the final product is called alcohol-ethylene oxide adduct or alcohol-ethylene oxide condensate.

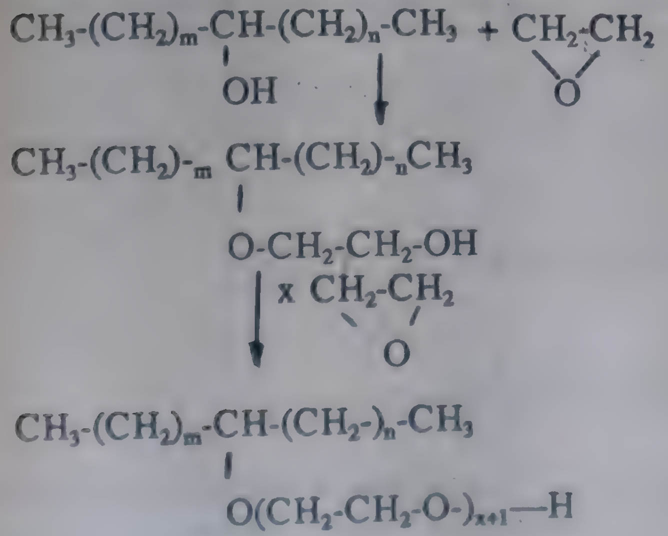
Fatty alcohols like lauryl, myristyl, cetyl, stearyl, and oleyl alcohols have long chain hydrophobic parts and their hydrophilic group (alcoholic group) is not powerful enough to impart the balanced water solubility and water insolubility. When one molecule of ethylene oxide is added to a fatty alcohol like stearyl alcohol, the oxygen atoms (now there are two) provide weak hydrophilicity. However, the product is still not soluble in water:


CH_3-$(CH_2)_{17}$-OH + CH_2-CH_2
O
CH_3-$(CH_2)_{17}$-OCH_2-CH_2-OH

The reaction with ethylene oxide has to be continued and more ethylene oxide molecules have to be added, first to give water solubility and then (at still larger number of ethylene oxide molecules) surface activity to the resulting compounds. Optimum hydrophilic-lyophilic balance can be obtained with 10-15 molecules of ethylene oxide condensed with one molecule of a fatty alcohol. In practice, different fatty alchols are condensed with up to 50 ethylene oxide molecules. With cetyl alcohol 20 molecules are enough to give the required surface activity, which is commercially important nonionic surfactant:


$C_{16}H_{33}OH$ + 20CH_2-CH_2
O
$C_{16}H_{33}$-O-$(CH_2$-CH_2-$O)_{20}H$

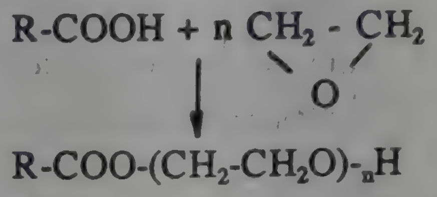
When secondary alcohols (prepared by the oxidation of n-paraffins) are used as the raw materials for producing nonionic surfactants, they are first condensed with one mole of ethylene oxide in the presence of an acid catalyst like boron trifluoride (BF_3). The catalyst and the unreacted alcohols are removed from the reaction mixture and further ethoxylation is carried out with more moles of ethylene oxide:


CH_3-$(CH_2)_m$-CH-$(CH_2)_n$-CH_3 + CH_2-CH_2
OH
O
CH_3-(CH_2)-$_m$ CH-(CH_2)-$_n$$CH_3$
O-CH_2-CH_2-OH
x CH_2-CH_2
O
CH_3-$(CH_2)_m$-CH-$(CH_2$-$)_n$-CH_3
O$(CH_2$-CH_2-O-$)_{x+1}$—H

Oleyl alcohol-ethylene oxide (mole ratio, 1:15) adduct is another commercially important nonionic surfactant:

Fatty acid-ethylene oxide condensates

These are another series of nonionic surfactants. These a made either by reacting a number of ethylene oxide mol cules with one molecule of a fatty acid or by reacting a po yethylene glycol with a fatty acid



$$\text{R-COOH} + \text{HO -(CH}_2\text{-CH}_2\text{-O)-}_n\text{H}$$
$$\downarrow$$
$$\text{R-COO-(CH}_2\text{-CH}_2\text{O)}_n\text{H}$$

In the second method, the diester can also form:

$$\text{R-COO-(CH}_2\text{-CH}_2\text{-O)}_n\text{H} + \text{R-COOH}$$

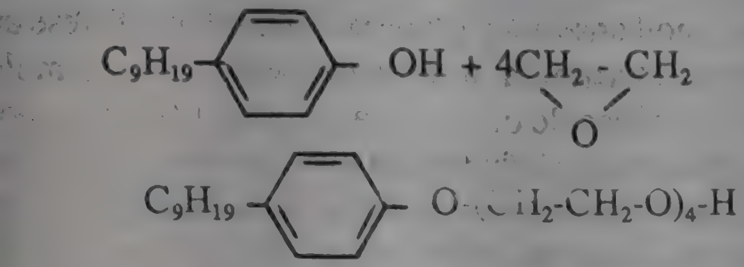
$$\text{R-COO-(CH}_2\text{-CH}_2\text{-O)}_n\text{-OC-R}$$

These nonionic condensates contain a number of oxyeth ylene units (ether links) as well as one or two ester group Because of the presence of ester groups, they are subject t hydrolysis under strong acid or alkaline conditions. In thi respect they are inferior to fatty alcohol-ethylene oxide con densates. However, like the latter (being nonionic) they ar usually unaffected by electrolytes (hard water salts), dilut acids and alkalies of moderate concentration. These have soft ening properties and hence are nonionic softeners. Some o these have dye-dispersing properties and are useful in dyein disperse dyes and azoic combinations (especially in the devel oping bath). Some others have good emulsifiying propertie Lauric, myristic, palmitic, stearic, oleic and ricinoleic acid are used as raw materials for preparing these polyethylen glycol esters:

$$\text{C}_{11}\text{H}_{23}\text{-COO-(CH}_2\text{-CH}_2\text{-O)}_n\text{-H}$$
$$\text{C}_{13}\text{H}_{27}\text{-COO-(CH}_2\text{-CH}_2\text{-O)}_n\text{-H}$$
$$\text{C}_{15}\text{H}_{31}\text{-COO-(CH}_2\text{-CH}_2\text{-O)}_n\text{-H}$$
$$\text{C}_{17}\text{H}_{35}\text{-COO-(CH}_2\text{-CH}_2\text{-O)}_n\text{-H}$$
$$\text{C}_{17}\text{H}_{33}\text{-COO-(CH}_2\text{-CH}_2\text{-O)}_n\text{-H}$$
$$\text{C}_{17}\text{H}_{32}\text{(OH)-COO-(CH}_2\text{-CH}_2\text{-O)}_n\text{-H}$$

Alkyl phenol-ethylene oxide condensates

Alkyl phenols are chemically different from fatty alcohols but they behave towards ethylene oxide in a similar manne There is a wide choice of the alkyl group, but generally octy nole of nonyl phenol, the resulting product is still in soluble n water and is soluble in oil.


C_9H_{19}
OH + $4CH_2$ - CH_2
O
C_9H_{19}
O-(CH₂-CH₂-O)₄-H

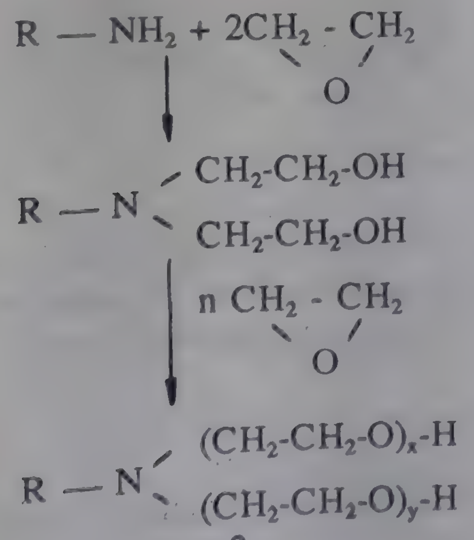
When five ethylene oxide moles are present, cold water solubility is imparted, while still retaining oil solubility. The condensates with 7 and 9 ethylene oxide moles are cold water- and hot water-soluble respectively. The cloud points of the products containing 5-13 oxyethylene units are in the range 20°-97°C. When this number exceeds 15, their aqueous solutions are clear at 100°C (soluble in boiling water).

The number of ethylene oxide molecules condensed with a particular nonyl phenol is an average number. Thus, if 10 moles of ethylene oxide are stated to be condensed with one molecule of nonyl phenol, the actual number may vary from 1-15 (there are various fractions having different number of oxyethylene units).

In the case of alkyl phenol-ethylene oxide condensates, the alkyl group exerts a pronounced influence on the properties of the final product. Thus, for getting maximum wetting and detergency in the case of monosubstituted (alkylated) phenol, the alkyl chain should contain 7-10 carbon atoms. If the chain contains more than 12 carbon atoms, good emulsifying property is imparted, but this takes place at the cost of wetting and detergency.

Amine adducts

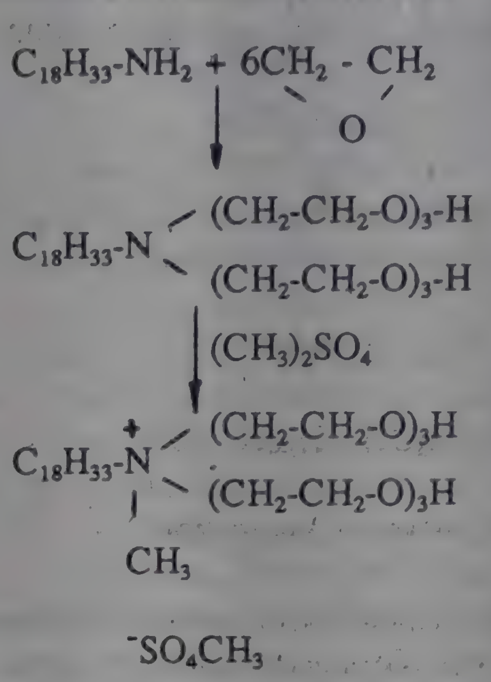
In the case of a primary amine, both the hydrogen atoms attached to the nitrogen atom can be substituted by oxyethylene units:


R — NH_2 + $2CH_2$ - CH_2
O
R — N
CH_2-CH_2-OH
CH_2-CH_2-OH
n CH_2 - CH_2
O
R — N
$(CH_2\text{-}CH_2\text{-}O)_x$-H
$(CH_2\text{-}CH_2\text{-}O)_y$-H

Where $x + y = n + 2$.

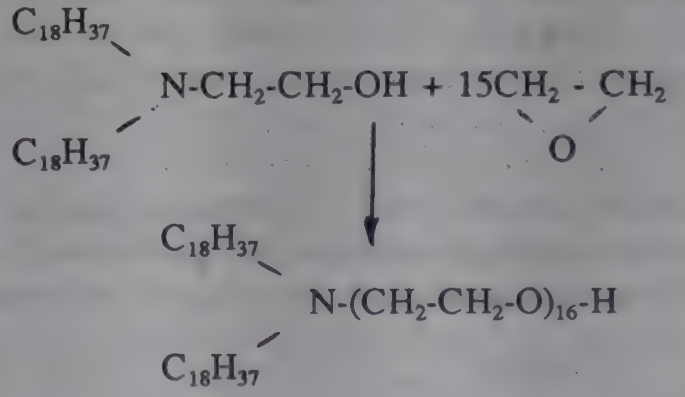
Because of the possibilities of substitution at the two cen[illegible]ducts of higher oxyethylene content can be formed than those with only one centre of substitution.

In a typical case, oleylamine is reacted with ethylene oxi (1:6) followed by quaternizing with dimethyl sulphate.


$C_{18}H_{33}$-NH_2 + $6CH_2$ - CH_2
O
$C_{18}H_{33}$-N
$(CH_2\text{-}CH_2\text{-}O)_3$-H
$(CH_2\text{-}CH_2\text{-}O)_3$-H
$(CH_3)_2SO_4$
+
$C_{18}H_{33}$-N
$(CH_2\text{-}CH_2\text{-}O)_3$H
$(CH_2\text{-}CH_2\text{-}O)_3$H
CH_3
$^-SO_4CH_3$

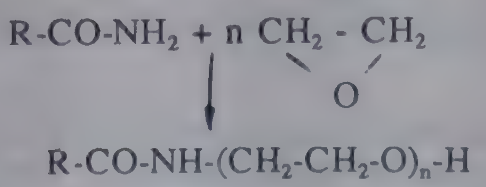
These find use as levelling and stripping agents in v dyeing.

Oleylamine-ethylene oxide adduct, with a higher degre of ethoxylation, itself has emulsifying properties. Anothe product, an antistatic agent, is made by reacting distearyl ethanolamine with ethylene oxide (1:15):


$C_{18}H_{37}$
N-CH_2-CH_2-OH + $15CH_2$ - CH_2
$C_{18}H_{37}$
O
$C_{18}H_{37}$
N-$(CH_2\text{-}CH_2\text{-}O)_{16}$-H
$C_{18}H_{37}$

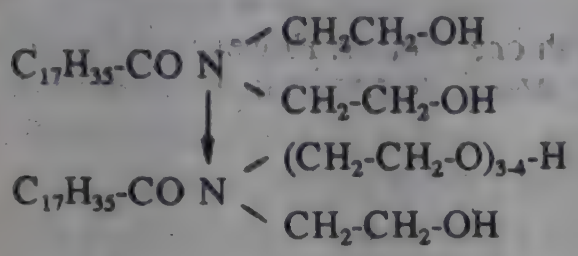
Amide Adducts

Ethylene oxide reacts with a fatty acid amide at one of th hydrogen atoms attached to the nitrogen atom:


R-CO-NH_2 + n CH_2 - CH_2
O
R-CO-NH-$(CH_2\text{-}CH_2\text{-}O)_n$-H

The second amide hydrogen remains unsubstituted for th most part. Lauramide (cocoamide), palmitamide, oleamid and stearamide are some of the raw materials used in th manufacture of amide adducts.

A typical product is made by reacting stearic acid dietha olamide with 2.5-3 moles of ethylene oxide:



Another is made by condensing 2,5-3 moles of ethylene oxide with stearic acid monoethanolamine:

$$C_{17}H_{35}\text{-CONH-}CH_2\text{-}CH_2\text{-OH}$$
$$\downarrow$$
$$C_{17}H_{35}\text{-CONH-}(CH_2CH_2\text{-O})_{3\text{-}4}H$$

Both are used as softeners for rayon fibres.

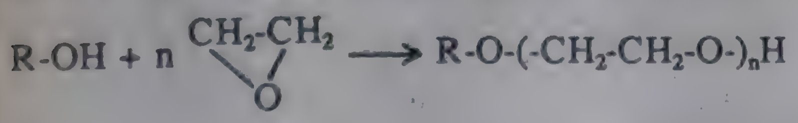
Tallow fatty amide is reacted with 5 and 15 ethylene oxide molecules to give emulsifiers and dispersing agents.

Miscellaneous Surfactants

Sulphated Ethers

Some of the nonionic surfactants are excellent detergents, emulsifiers, softeners, dyeing assistants etc. These nonionic detergents produce weak foams and though soluble in cold water, they cloud at higher temperatures and are likely to form separate layers over water. Fatty alcohol sulphates (anionic surfactants), on the other hand are good foam formers but do not produce clear solutions at sufficiently high concentrations.

Fatty alcohol-ethylene oxide condensates have an end hydroxy group, which can be sulphated to overcome the difficulty of clouding appearing in the solutions on heating.



$$R\text{-O-}(CH_2\text{-}CH_2\text{-O})_n\text{-H} \xrightarrow{[ClSO_3H]} R\text{-O-}(CH_2\text{-}CH_2\text{-O})_nSO_3H$$

$$R\text{-O-}(CH_2\text{-}CH_2\text{-O})_n\text{-}SO_3H \xrightarrow{[NaOH]} R\text{-O-}(CH_2\text{-}CH_2\text{-O})_n\text{-}SO_3Na$$

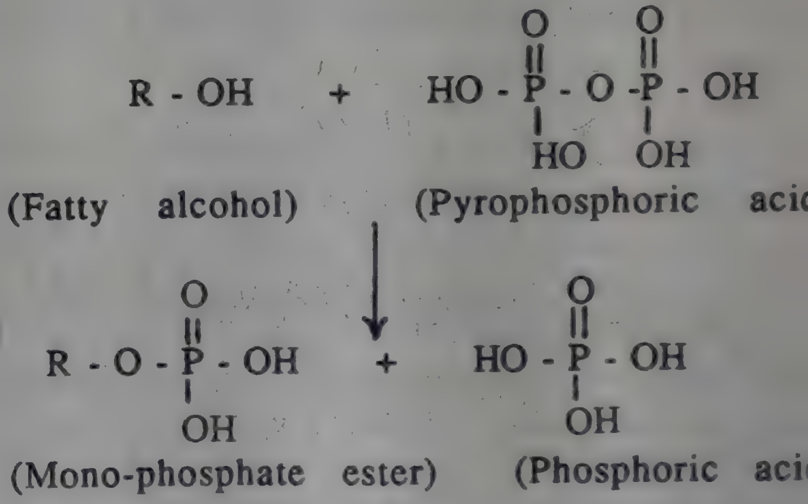
In this case, the ethoxylation is not carried out to get detergency in the nonionic product (before sulphation). They are, in fact, made by condensing 2-4 ethylene oxide molecules per molecule of the fatty alcohol (the resulting product is still insoluble in water), and then sulphated, and neutralized. Since the ethoxylation of the fatty acid is carried out to a low degree, considerable amount of the fatty alcohol remains unreacted.

per mole of the fatty alcohol. Hence during the subsequen sulphation of the ethoxylated product, the free alcohol is als sulphated, so that the final product contains a substantia amont of the fatty alcohol sulphate as well.

Sulphated ethers have high foaming propensities. They ma be added to anionic detergents to boost their detergent properties. Thus, they may be added up to 20% on the weigh of the alkyl aryl sulphonate detergent.

Phosphate esters and phosphated ethers

When fatty alcohol-ethylene oxide condensates or alky phenol-ethylene oxide condensates are treated with pyrophosphoric acid, the corresponding phosphate esters, which are mixtures of mono and diesters, are formed. In practice, the products formed contain about two-thirds monoester and one-third diester. Simultaneously, one mole of phosphoric acid is also formed, which is not separated from the final product:



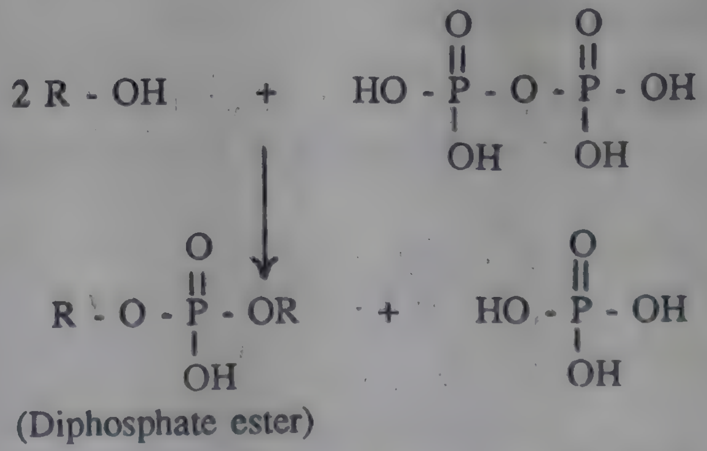
$$R-OH + HO-\overset{\overset{O}{\|}}{\underset{\underset{HO}{|}}{P}}-O-\overset{\overset{O}{\|}}{\underset{\underset{OH}{|}}{P}}-OH$$

(Fatty alcohol) (Pyrophosphoric aci

$$\downarrow$$

$$R-O-\overset{\overset{O}{\|}}{\underset{\underset{OH}{|}}{P}}-OH + HO-\overset{\overset{O}{\|}}{\underset{\underset{OH}{|}}{P}}-OH$$

(Mono-phosphate ester) (Phosphoric aci



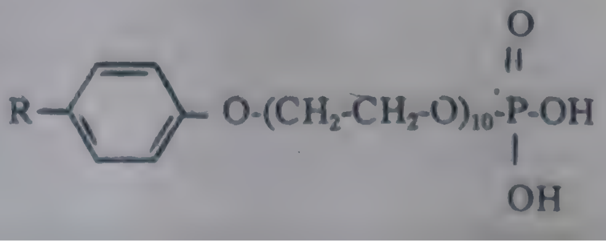
$$2\,R-OH + HO-\overset{\overset{O}{\|}}{\underset{\underset{OH}{|}}{P}}-O-\overset{\overset{O}{\|}}{\underset{\underset{OH}{|}}{P}}-OH$$

$$\downarrow$$

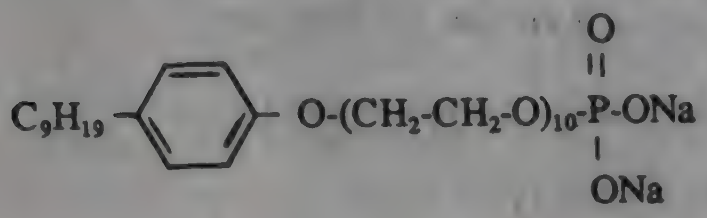
$$R-O-\overset{\overset{O}{\|}}{\underset{\underset{OH}{|}}{P}}-OR + HO-\overset{\overset{O}{\|}}{\underset{\underset{OH}{|}}{P}}-OH$$

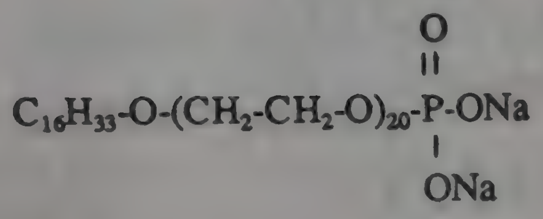
(Diphosphate ester)

Non-volatile phosphate esters of alkyl phenol-ethylene oxide condensates are found to be antistatic agents in combination with fatty acid-ethylene oxide condensate:



Phosphated nonyl phenol-ethylene oxide condensate and etyl alcohol-ethylene oxide condensate (disodium salts) can e used as levelling agents in dyeing nylon with acid dyes:





$$C_{16}H_{33}\text{-}O\text{-}(CH_2\text{-}CH_2\text{-}O)_{20}\text{-}\overset{\overset{O}{\parallel}}{P}\text{-}ONa$$
$$\hspace{6em}|\;ONa$$

Anionic-Cationic complexes

Oleyl-N-methyl tauride, the anionic detergent, finds another use in producing more permanent softening effect when used in conjunction with a cationic softener. It may be mixed (5-10%) with the cationic softener, say, the one based on coconut fatty acid-diethanolamine condensate. Generally, a onic and cationic surfactants are not used in the same f mulation or in the same application bath, since they incompatible with one another. However, this combinati is an exception. When oleyl-N-methyl tauride is dissolv in water, it ionizes into a long anion and a small sodi cation. On the other hand, when the cationic softener is d solved in water, it produces a long cation and a small ch ride (or acetate) anion. If both the solutions are mixed, long ions of opposite ionic charges neutralize their char and the resulting complex (without any charge) tends to p cipitate. However, the excess cationic softener present in system acts as a dispersing agent and prevents such prec itation. Since both components of this complex are hyd phobic in nature and having softening and water repelli properties, they exhibit increased softening properties a water repellency to a fabric in which the complex is dep ited by, say, pad-dry technique. Both these properties are m permanent than those produced by the cationic softener alo Being unable to ionize, the complex is insoluble in water a hence has very high washing fastness.

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Chemical News from Abroad

ARDINI BOOSTS FERRUZZI ITH MONTEDISON MERGER

Montedison is currently undergoing ajor reorganisation as part of a scheme r a merger with Ferruzzi Agricola inanziaria to create a new Italian indu-rial giant. The newly merged com-any, which will retain the name of lontedison, should make it easier for vestors to evaluate Ferruzzi's business nd help it to raise money on interna-onal markets. Ferruzzi, which previ-usly held 37% of Montedison, also erves as a holding company for both ne Ferrzzui group's chemicals business nd the agro-industrial activities of its 3% owned subsidiary Eridania.

The merger will effectively eliminate n intermediate level in the group's rganisational structure, thus placing Eridania under the control of the newly onstituted Montedison holding. Indus-ry sources say the complex deal will ncrease Raul Gardini's hold over Ital-an industry. Through the deal, the nom-nal value of Agricola shares are to be ncreased from L800 ($0.69) to L1,000 n a four-for-five consolidation. Agri-cola will then offer seven of its shares for every 10 of Montedison. The offer values Montedison at around L7.5 tril-lion in equity value.

Commenting on the decision to merge Montedison into Agricola, sources from the Ferruzzi group say the main aim is to form a new holding company which re-emphasises Ferruzzi's strategic commitment to chemicals, with the objective of achieving an ever-increasing level of integration between chemicals and agro-industrial activities. The new Montedison will pressure major new developments in the environmental area through the integration of all its technologies in the chemical, agro-industrial and energy sectors. Furthermore, the company expects that the new merged entity will be able to strengthen its position in international financial market which Montedison says will allow it to fund the development of its industrial activities more effectively.

Meanwhile, analysts say the merger provides considerable benefits for the shareholders of both companies. As far as the shareholders of Ferruzzi Agricola Finanziaria are concerned, the new entity will have a stronger capital structure and will provide an opportunity to diversify their portfolio. For the shareholders of Montedison, the proposed merger provides the opportunity to add control of the Eridania/Beghin-Say agro-industrial group to Montedison's existing chemical activities.

Eridania/Beghin-Say holds a leading position in Europe in the sugar, oils and starch businesses. These have a high level of profitability and a low degree of cyclicality, typical of agro-industrial activities as compared to chemicals. Other sources say this is quite a move as far as Ferruzzi's chairman Gardini is concerned. By taking control of Montedison and using the other 11% Enimont held by him or his associates, Gardini will control a majority of Enimont.

MTM EXPANDS IN US

MTM Research Chemicals is extending its operations in the US with the $1m acquisition of Florida-based Farchan Laboratories. Managing director for MTM Research Chemicals, Alec Ingram, said: 'Farchan brings further technical expertise, valuable new technologies and additional resources into the company'.

Farchan's turnover for the year ending February 1990 was $766,000. The company has production and laboratory facilities in Gainesville, Florida. Farchan's production facilities supply fine chemicals in research and semi-bulk quantities for applications in pharmaceuticals, agrochemicals and the aerospace industry. Meanwhile, Farchan's managing director, John Cochran, wi join the board of MTM Researc Chemicals.

BENCKISER BUYOUT

Benckiser's water treatment division once a major pillar of the Ludwigshafer group's business, appears to be heading for a management buyout. This follows a decision by Benckiser to sell the division which incorporates 11 separate companies in six countries, including West Germany, France, Belgium, Italy, Spain and Austria, to its management to concentrate on brandnames products. Following a two-year acquisitions programme, consumer chemicals now account for more than 90% of the group's consolidated worldwide sales of DM2.21bn ($1.3bn). The water treatment business, which focuses mainly on engineering for industrial plants, along with water purification units for homes and swimming pools, had begun to take a back seat in the company's drive downstream.

ICI SEALS CZECH DRUG LICENCE DEAL

An agreement to produce ICI's top selling heart drug, Tenormin, in Czechoslovakia was signed in London recently by the general director of Lachema, the Czechoslovakian chemicals and pharmaceuticals manufacturer, and John Mitchell, chairman of ICI East Europe. Under the agreement, ICI Pharmaceuticals will provide formulation technology and supply atenolol, the drug's active ingredient. This will enable 4m tablets to be produced initially at Lachema's factory at Brno, Czechoslovakia. ICI says the agreement could see out-put rise to between 15 and 20 m tablets by the third year of production. Tenormin is ICI Pharmaceuticals' world leading beta blocker. A similar agreement for Tenormin has already been signed betwen ICI Pharmaceuticals and Alkaloida, a Hungarian pharmaceutical manufacturer with a production unit at Tiszavasvari, northeast of Budapest. ICI has said that it hopes the agreements will be the forerunners of many more similar ventures. "These agreements are spearheading our efforts in the emerging East Europe economics", said John Hornsby, Central and East European sales manager at ICI Pharmaceuticals.

BAYER DENIES STORY

Bayer has rejected allegations in the Spanish newspaper El Independiente that it had delivered chemical waste to Spain illegally.

Bayer says the material, which it sold to the state-owned Spanish mining company Minas de Almaden, was not waste as was claimed in the Spanish publication, but a mercury compound resulting from the production of dyestuff intermediates. Minas de Almaden, one of the world's leaders in the mining of mercury, bought the compound from Bayer because of its high-mercury content in order to extract the metal and recycle it.

In return, Bayer obtained its own mercury requirements from Minas de Almaden. The trade agreement was licensed by the Spanish government.

Furthermore Bayer claims the material was transported to Spain in an orderly fashion using special containers and not in unsuitable and damaged containers, as alleged in El Independiente. It is also untrue that the consignments were sent without accompanying documentation or declaration of their contents, the group claims.

EAST GERMAN POTASH MINES SET TO BE SOLD

East Germany's potash mines appear to be at the top of the list of endangered industries as the country adapts to a market economy. Reiner Gholke, head of the Treuhandanstalt, responsible for privatising the former Communist industry sectors are to be closed later this month.

Sources say that whole sectors of the East German industry, which have been run for decade by a centrally planned economy, were beyond rescue. 'Potash is a problematic area, as its prices on the world market have fallen and European fertiliser capacities have been cut back radically" explained one market source.

Meanwhile, sources say there is no doubt that a number of West European firms could be interested in buying stakes in the East German potash industry. BASF's subsidiary Kali und Salz confirmed to ECN that it was currently negotiating possibilities for it to participate in this field and analysts say it would be a feasible move.

There is also a strong feeling that French concerns, particularly EMC, may be interested in picking up GDR mines as capacities in Alsace may be running low. This view was recently backed by chairman of BASF Jurgen Strube.

In Strube's view if the East German potash industry is to be saved, it will, like the rest of the country's industry, have to adopt conditions of a market economy and it is essential that they improve productivity considerably.

Commenting on the state of the potash industry in East Germany, one market observer for a London-based consultancy said that if any company does decide to invest, it will have to also invest in more modern, expensive machinery to improve environmental standards there. The mines are known to be a primary source of pollution on the Werra and Weser rivers.

One source said that if any mines were to be closed it would probably be those in the central region of the country which produces a low grade material from magnesium. By contrast, the could be a safe bet for a possible in
tor as it produces mainly for exports
opened in the early 1970s; and does
need much modernisation.

Meanwhile, as a further step to red
potash porduction in the Kali W
potash mines, on the river Werr
15-25% reduction in weekly work
time is anticipated in addition to an e
retirement scheme. Around one-thir
the 4500 employees will work only
days/week.

NORWAY TO BACK SOVIET CLEAN-UP

The Norwegian government is c
sidering offering the Soviet Ur
Nkr2.5bn ($403m) in soft loans
credits to modernise its chemical
metallurgy-based industries on the K
Penninsula, state secretary Kai E
confirmed.

Norway's prime minister Jan Sys
scheduled to meet a visiting Soviet
egation led by environment mini
Nikolai Veronchev in Oslo later
month. They will discuss the probl
of tackling cross-border pollution f
Kola, which is destroying large tra
of forests and endangering the ecol
ical balance of areas in north
Norway, Sweden and Finland, say s
ces. 'I want Nordic countries to ne
tiate the best agreement possible
dialogue is essential if results are t
guaranteed', said Syse.

The Helsinki-based Nordic Inv
ment Bank (Nib) has been directe
administer the recently formed in
governmental agency Nordic Envi
mental Finance Corp. (Nefco) whic
expected to begin operations in Octo

Nefco's main role is to help No
environment plant and technology f
establish joint production ventures
East European business partners. S
ces say Nib will invest Ecu38m ($2
in joint venture projects over the

Chemical Markets Abroad

C MEG PRODUCERS ALLEGE S AND SAUDI DUMPING

European producers of ethylene oxide O) derivatives are accusing the US d Middle East producers of dumping onoethylene glycol (MEG), ethanol- mines and glycol ethers in the Euro- ean market, seriously affecting sales nd price levels. An official complaint the European Commission may llow.

In June, European producers attemp- ed to put a floor under the price slide MEG, BP announced a DM100/tonne rice rise for Q3 with the expectation hat prices would recover to around the M 1000/tonne level before the end of he quarter. Despite support from other uropean producers and rising ethylene rices, the move has failed. Instead, rices are under even greater pressure, ith no contracts negotiated for Q3. But xpectations of prices well below M800/tonne for fibre grade have been oiced by several players in the market. here has been some agreement on July rices with numbers around M700/tonne said to have been ccepted.

Behind the European price slide is said to be a battle for market share between the Middle East and US producers in the Far Eastern fibre markets. This has resulted in Far East MEG prices collapsing to one-third of their 1989 levels, and other EO derivatives have followed. There has been some acceptance of Q3 fibre grade contract pricing as low as $410/tonne cif, although some producers argue that this is the price at 'port of entry' and $30-40/tonne should be added to achieve a price of product delivered at the plant. A price of $440-450/tonne translates to DM708-724/tonne. Weakness in the Far Eastern markets has been transmitted to Europe. One European producer is talking about prices out of the US Gulf as low as $310/tonne FOB which, with freight rates of upto $40/tonne suggests a European price of around DM627/tonne cif., including 13% duty. A European MEG buyer asserts, however, that these prices are exaggeratedly low and that the lowest prices he has seen out of the US Gulf to date have been around $350/tonne fob, translating to around the DM700/tonne cif for T1 material in Europe.

European producers see low prices in Far East markets encouraging US and Middle Eastern producers to increase their efforts in the European market. Producers complain that customers are being approached by the US producers willing to undercut Q2 contract levels. Business is being unfairly lost because it is subsidised by the high domestic prices of the US producers, they also claim. US list prices for fibre grade product are 26 cent/pound, but producers admit to discounts in the region of 10% being fairly universal.

Other industry observers believe the US fibre grade price is probably closer to 22 cent/pound. Prices out of the Gulf are currently around 16-16.5 cent/-pound, leaving a considerable gap between domestic and export prices, albeit a much smaller gap than at the beginning of 1990, when list prices in the US were 32 cent/pound and export prices were 16 per cent/pound. With no data available on production costs, it is difficult to estimate whether these exports are leaving the US at prices below economic cost.

US customers, paying prices still considerably ahead of world market levels, are effectively subsidising the production of their competitors in Far East markets. At a time when the US is initiating anti-dumping action on Far East imports of PET, US producers are supplying Far East producers at prices below those enjoyed by their own PET producers. Similarly, moves to protect the US textile industry from polyester imports of Far Eastern origin are underway, but these same Far East polyester producers buy low-priced MEG from US producers.

One European purchaser believes that the impetus to change all this is already there in the move towards a global market for MEG. He believes that European producers would find it difficult to prove dumping against US producers in general, operating from lower cost bases than the Europeans. The low Middle East cost-base may make dumping allegations against Sabic very difficult to substantiate.

US producers claim to have had little impact on contract business in Europe. They claim US exports of MEG to Europe in 1989 were exaggerated by an error in the US export statistics and that they were lower than in previous years, especially if some covering between the US and Europe for the BASF Antwerp explosion is taken into consideration. They accuse European producers of debottlenecking plants and allowing capacity to move ahead of demand, effectively creating their own problems.

OPP SET TO GROW IN WESTERN EUROPE

Consumption of oriented polypropylene in Britain, West Germany, France and Italy is set to rise by 8%/year, increasing from 180,000 tonne in 1989 to over 260,000 tonne in 1994.

Extended to Western Europe as a whole, this trend implies consumption of some 380,000 tonne by 1994, balancing demand with production capacity. This would compare with the situation in 1989 when spare capacity approached 35%. These are some of the findings of a four volume report, just published by IAL Consultants, examining the oriented polypropylene markets in Britain, Germany, France and Italy.

Italy is the biggest market in Europe, consuming around 74,000 tonne last year. British consumption amounted to

54,000 tonne with West Germany following with 38,000 tonne and France with 25,000 tonne. While in Britain the product has been used in campaigns to improve the image of convenience food packaging, in French penetration has been limited. In Germany, environmental concerns are obstructing the growth of PVC coated oriented polypropylene. Despite the high level of usage in Italy, particularly for pasta packaging, the study argues that there is substantial potential remaining.

ARCO REPLIES

Arco and Austin Industrial, the employer of the contract workers employed at the Arco Channelview plant at the time of the explosion, have refuted allegations made by the oil, chemical and atomic workers union (UCAW) concerning the safety of using contract workers on petrochemical installations. In statements made before the subcommittee on employment and housing of the US House of Representatives both companies emphasised the level of training and the experienced nature of the Austin workforce.

The 11 workers killed in the explosion had an average experience of two years in the Arco plant as Austin Industrial employees and all but one had previous experience in the petrochemical industry. Contract workers were employed in the routine maintenance of the plant and in 'turnaround' or 'shutdown' projects when extra, equally experienced people might be moved to the plant, the company states.

ACRYLO Q3 CONTRACTS DELAY — BP PLANT CLOSURE?

Acrylonitrile Q3 contract negotiations have been even more protracted than usual with neither side eager to settle before all the cards have been shown. The propylene contract for Q3 has emerged at DM660-670/tonne FD. before entering the battleground for Q3 settlement. Q2 contracts for fibre products were generally settled in the DM1170/tonne area, reflecting the level of pain being experienced by the European acrylic producers. Non-fibre buyers settled at prices between DM1220-1260/tonne. Already, some of these buyers are said to have agreed Q3 contract prices at DM70-80/tonne up on Q2 levels, fully reflecting the increase in the propylene price.

Other ABS and SAN producers have not settled; they view sympathetically the plight of the acrylonitrile producers and believe that part of the propylene increase may be reflected in their settlement. Fibre producers say no agreement is in sight and point to considerable amounts of spot materials on the European market undermining European price levels. They cite Mexican product available at $550/tonne, which translates to prices around DM995/tonne. US product is also freely available, although Soviet product is still not coming out of the port of Ventspil. Despite clauses which say agreement on contract levels must be reached by the end of the first month of the quarter, buyers say these precedents have already been broken and believe there is no incentive to settle when product is freely available on the spot market.

Fibre producers cannot easily accept price increases given the poor climate in which they are operating. Further fibre plant closures are thought to be inevitable and market sources suggest that the closure of BP's Grangemouth acrylonitrile plant is also imminent. Sources also suggest that the 270,000 tonne/year plant announced several years ago as a replacement in the UK market will not now go ahead. The design team at Ralph Parsons, the contractor awarded design engineering work last December has now been disbanded.

Erdolchemie joint venture in We Germany, with back-up from its Gree Lake plant in the US. This, theoreticall removes a further 70,000 tonne/year c capacity from the market, although i reality it probably increases the loadin and improves the economics of th remaining plants. As one playe observed, psychologically, the mov may be good for the market but, wit further European fibre closures ahea it is the market balance that counts, an there is no guarantee that enough ha been done. Producers, however, clain that supply has already tightened following the Norsolor closure and tha published industry inventory figure demonstrate a distinct tightening in th market over the past months.

FAR EAST BENZENE GROWTH

World benzene nameplate capacity i estimated at close to 28m tonne, wit capacity takeup expected to rise over th next three years, according to a recentl published study, Chemical Matter World BTX Report. This will be particularly true of the benzene producin regions of North America and Wester Europe, bringing more toluene hydrodealkylation capacity into operation. A additional 2m tonne/year of benzen extraction capacity is planned for Japa but many projects may not see the ligh of day, the report says.

Benzene capacity expansions i South East Asia and the Far East o around 700,000 tonne/year are expecte onstream by the end of 1993, along wit significant increases in paraxylen capacity: 600,000 tonne/year in Japan 270,000 tonne/year in Indonesia 300,000 tonne/year in Singapore 276,000 tonne/year in Thailand an 200,000 tonne/year in South Korea. I the Middle East, benzene extractio capacity could rise by as much as 1. m tonne/year by the end of 1993 i countries such as Iran and Iraq are abl to revitalise their petrochemical plans

News From Japan

TOSOH TO FURTHER RAISE CAUSTIC-SODA CAPACITY

In response to the tight supply-and-demand situation in Japan for caustic soda, Tosoh Corp. aims to scale up production capacity for the product by 60,000 tons a year at its Nanyo factory (Yamaguchi Prefecture) by the end of next year. Related construction will be inaugurated within the year.

The company raised its capacity for the product by a total of 120,000 tons a year in four steps, the first being in August last year and the last, last June. As a result, its combined capacity has reached 635,000 tons a year. The above mentioned tight supply-and-demand situation has forced the company to defer dates of deliveries including exports and reduce the supply volumes ordered.

Prior to the planned capacity-build up the company intends to immediately expand production capacity for vinylchloride monomer produced from chlorine — a co-product of caustic soda —to 485,000 tons a year by means of debottlenecking of existing plants. The company is able to easily expand caustic-soda production since demand for the product is projected to continue annual growth of more than 3% and, what is more, it has commercialized vinyl-chloride monomer, a major outlet for chlorine.

It is through-producing vinylchloride resin from chlorine via production of ethylene dichloride (EDC). EDC produced by the company itself is capable of competing with imported EDC priced at approximately $160/t.

S. KOREA'S CHEMICAL PROJECTS UNDER RECONSIDERATION

Several S. Korean chemical firms are re-examining their large-scale projects

their profitability and possible oversupply of the targeted products. Kumho Mitsui Toatsu is scheduled to halve planned production of diphenyl methanediisocyanate (MDI) (40,000 t/y) and carbon black (100,000 t/y) since several newcomers will launch into MDI business and Korea Steel Chemical plans to build up carbon-black operations.

Isu Petrochemical earlier planned to commercialise polypropylene in a team-up with Nikki Universal (Japan) but has shelved the plan because it is worried about oversupply of the product itself. Korea Pacific Chemical had also aimed at branching out into polypropylene business but is now moving toward improving the efficiency of related synthetic-resin operations in a tie-up with a domestic petrochemical firm.

Dong-Yang Chemical originally planned to produce 6,000 tonnes a year of hydrazine via Dong-Yang Atochem, jointly established by the company itself and Atochem (France). It has, however, abandoned the project in view of the low profitability concerned and closed the joint firm.

The Lucky group is re-examining its plan for producing 100,000 tonnes a year of phthalic anhydride since two rival firms recently worked out production-expansion plans and its plant site has become cramped. Other S. Korean chemical firms are scheduled to build naphtha crackers and manufacturing plants for polyolefin, raw material for synthetic resin and synthetic rubber, etc. These ambitious plans may be influenced by the abovementioned moves to a certain degree.

MHW TO APPROVE USE OF FOOD ADDITIVES USED OVERSEAS

The Ministry of Health and Welfare (MHW) has consulted the food sanitary

— about approving 10 food additiv be used in Japan. The additives inc Food Red No. 40 extensively use the U.S. and the glutamic acid salt w out sodium which is considered ef tive for preventing adult diseases.

If the committee advises approva the additives in question as required will help increase imports of fore food products and the types of fo stuffs available in Japan. It is the f time in several years that MHW requested the committee's advice ab uses of food additives.

In the U.S. consumption of Food R No. 40 has been rising rapidly sin Food Red No. 2 was suspected having a cancer-producing effect. MHW official says that, although t colour of Food Red No. 40 can be pr duced by mixing food-use colourar available in Japan, the American co fectionary industry strongly requeste MHW to approve use of the coloura to give its products freer access to t Japanese market.

Approval of ascorbic acid palmit acid ester as a food additive was soug by Hoffman-La Roche (Switzerland The substance has been widely used i foreign countries and MHW intends t approve its use from the standpoint c international coordination. Sodium an calcium salts of glutamic acid, citri acid and alginic acid will also b approved according to the committee' advice in view of their good effects o human health. The Japanese government has so far approved a total of 34 substances to be used as food additives

DAICEL CHEMICAL BUILDS NEW FINE-CHEMICAL PLANT

Daicel Chemical Industries Ltd. has completed at its Arai factory a 4-storied plant for producing intermediates and raw materials for pharmaceuticals. The new plant is equipped with high-pressure/low-temperature reactors, molec ssure column separator and a GMP- apted clean room. The plant is xected to build up fine-chemical ope- ions using advanced organic synthe- technology. The Arai factory has any fine-chemical plants designed to oduce intermediates for drugs and rochemicals. The company has herto endeavoured to develop phar- aceutical intermediates on the strength its Tsukuba and Himeji laboratories.

IC BUILDING 3,500-T/Y PLANT OR POLYPHENYLENE SULFIDE

Dainippon Ink & Chemicals, Inc. DIC) is building a 3,500-t/y plant for olyphenylene sulfide (PPS) at its ashima factory with completion sche- uled for next March at latest. The com- any — Japan's largest producer of PS-based molding compound — has 7,000 t/y compounding plant and has itherto bought raw material resin (PPS) om outsiders including Phillips (U.S.). has decided to produce the resin by self in response to growing demand for se in precision parts for automobiles nd electrical/electronic equipment.

Targeted products are PPSs for pol- mer alloy, carbon-fiber composites and iber; high-fluidity, high-tenacity and ow-ion concentration PPS for emiconductor-packaging use; and rosslinking-type PPS. The company ntends to continue buying versatile PPS lready put on the market. It developed nd commercialised polythioether-sulfone resin three years ago and, in connection with this, began to produce special PPS resin.

With regard to PPS-compounding operations, it plans to build a new plant at its Komaki factory within the year since the Amagasaki factory has become cramped.

PPS resin features strong thermal/chemical resistance and also has rigidity, dimensional stability, noninflamm- bility and moldability. It is being

molding material, fiber (bag filters) and film (heat-resistant insulating material). Its market size is projected to rank next to that of nylon and polycarbonate some time in the future.

In view of the resin's considerable potentialities, several domestic firms have launched into the business arena one after another. DIC's entry into the field will intensify market competition further.

SHOWA DENKO TO LOWER NAPHTHA DEPENDENCE; SECURING LPT, NGL

Showa Denko K.K. has reviewed its strategy for petrochemical raw materials taking into consideration the sudden change of economic surroundings triggered by the recent Middle East turmoil. The company is to shift its major naphtha source from Kuwait to Saudi Arabia and, in parallel, hammer out measures for ensuring supplies of LPG and NGL to replace naphtha.

Already having naphtha stockpiles for the August-September period, Showa Denko is eager to secure raw materials for and after October. The company buys about 300,000 tons of raw-material naphtha annually from Kuwait, accounting for approximately 30% of its total consumption.

With the recent Iraq invasion of Kuwait, it has become pessimistic about obtaining naphtha from the latter country, and in actuality the company in and after October will almost certainly face some hitches in attempting to have a good supply of naphtha.

On the other hand, its ethylene capacity was boosted from 600,000 to 730,000 t/y by means of partial modification of its No. 2 ethylene plant. The newly expanded unit will go fully onstream this September. This being the case, Showa Denko is positive in switching raw-material sources and

The company is to expand the shares of LPG and NGL used to lower its dependence on naphtha. In tandem, it is considering stabilised supply of ethylene by means of import.

Not only Showa Denko, but also Osaka Petrochemical Industries and Asahi Chemical Industry which highly depend on Kuwaiti-sourced material are unavoidably seeking some measures for securing raw materials. Further diversification of raw materials and their sources seems to be inevitable.

POLYESTER FILAMENT PRODUCTION RISES IN FIRST HALF OF 1990

Japan Chemical Fibres Association has gathered statistics concerning the production and stockpiles of synthetic fiber for the first half of this year (January thru June). Of the four major kinds of synthetic fibres — polyester staple, polyester filament, nylon filament, and acrylic staple, polyester filament continued to show the smoothest production increase, as in the preceding year.

Its output amounted to 196,400 tonnes, or an increase of 11.2 per cent over the level of the corresponding period of the preceding year. Stockpiles of acrylic staple, which is regaining its bright prospects, fell to the 20,886 ton level, or 13 per cent less than the past peak (24,032 tons) recorded at the end of November 1989.

Polyester filament production has continued to increase — in terms of comparison with the corresponding month of the preceding year — for 23 months since August 1988. The reason is that the use of high-class polyester — dubbed "new synthetic fiber" — is increasing in the field of such industrial materials as tyre cord and car seats, as well as in the field of ladies' clothes. However, the stockpiles continued to increase for 12 months until the end of June recording an expansion of 18.5%

period of the preceding year. On the other hand, it is generally expected that production will continue to show an upward trend in the second half (July thru December) as well. So, it is considered certain that the production record, which was established last year, will be renewed.

Last year, acrylic-staple production fell to 363,000 tonnes, or 8 per cent less than that in the preceding year. In the first half of this year, however, it decreased by only 4 per cent in comparison with the corresponding period of the previous year. There are growing signs of recovery.

In the background is the fact that exporting to China, which was suspended last year, has been resumed this year and that imports of acrylic cotton yarn have become stabilised. Stockpiles, too, are dwindling gradually, and are likely to fall below the level of 20,000 tonnes within this year.

Nylon-filament production amounted to 135,100 tonnes, or an increase of 2.2% in comparison with the corresponding period of the preceding year. Polyester-staple production amounted to 153,300 tonnes, remaining at the level of the corresponding period of the previous year.

IHARA CHEMICAL TO EXPAND INTERMEDIATES BUSINESS

Ihara Chemical Industry Co. will strengthen and consolidate its intermediates business centered on chlorotoluene derivatives to make up for the decrease in its technical-grade agrochemicals, which have been showing a long-term tendency to drop off.

According to the medium-term management plan being worked out at present, the company intends to achieve a ¥30-billion turnover for the March 1994-term settlement of accounts, of which ¥20 billion will be accounted for by intermediates, double the present intermediates turnover.

Furthermore, the company will shortly complete construction of its first multipurpose plant at its Shizuoka factory (Shizuoka Prefecture) and will construct more plants and facilities, investing ¥15-16 billion every year.

Ihara Chemical is mainly manufacturing technical-grade agrochemicals, various intermediates and amires. Over the past several years, however, the technical-grade agrochemicals business has tended to decline due to the influence of the negative growth of the agrochemicals market, etc.

The technical-grade-agrochemicals business once accounted for over 50 per cent of the company's total turnover but this term it is expected to decrease to about 30 per cent.

The company therefore intends to expand its business scale by investing in its intermediates business which been showing a favourable incr recently. The company will keep rious highly functional high-va added products in stock centerec chlorotoluene derivatives which borne fruit in markets at home abroad, applying fluorination tech ogy, etc.

At the Shizuoka factory, the com ny's production base, the No. 11 pl which the company started construc this spring at a cost of about ¥1 bill is to be completed next month and go into operation from September. a result, production of items wh could not be mass-produced by exist plants will become commercially via Production capacity will be expan by 50%.

Furthermore, the company intends streamline its supply structure, mak plant-and-equipment investment ¥15-16 billion each year.

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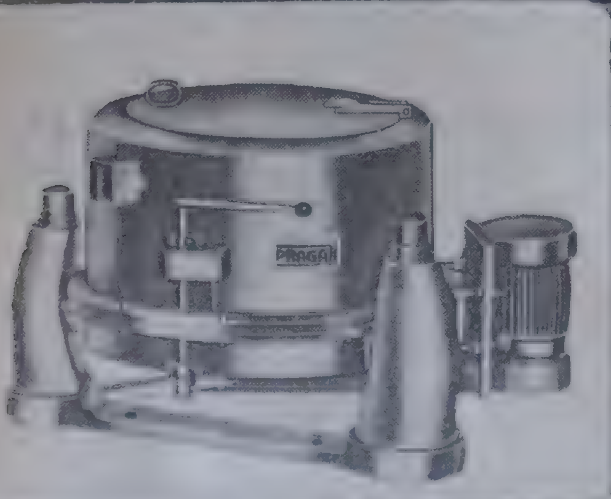

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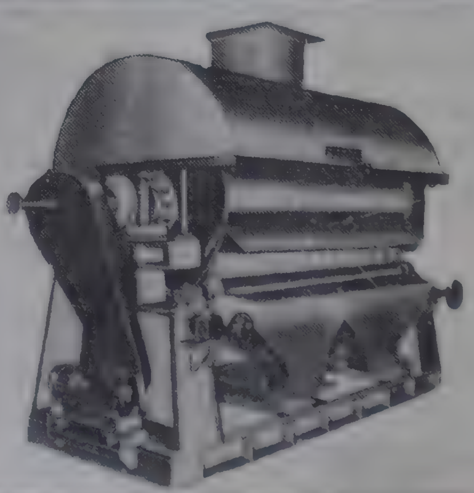

Manufactured by
Plot No. N-8, Shed No. W-88 (A)

New Developments from Japan

REFRIGERATING-MACHINE OIL COMPATIBLE WITH HFC-134a

Mitsui Petrochemical Industries has successfully developed refrigerating-machine oil having good compatibility with HFC-134a — a substitute for CFC-22 used as a coolant for air conditioners and refrigerators. The new product is a special ester produced through modification of polyalkylene glycol (PAG).

The company has begun sample deliveries having signed secret contracts with users. It is scheduled to build a mass-production plant (output: several thousand tons a year) next summer in a bid to inaugurate commercial supply of the new product in the fall of next year. It also plans to establish a world-wide supply network for the product since it seems to be commercially viable throughout the world.

Refrigerating-machine oils produced from ester of PAG have been commercialised but their drawbacks are that the former is easily hydrolysed and lacks oxidation stability and the latter also lacks the volume resistivity ($10^{13}\Omega$cm) needed for a refrigerator motor. The company has concluded that they are unsuitable for air conditioners and refrigerators employing HFC-134a.

HFC-134a has been developed by Du Pont (U.S.) and will replace CFC-22 on a broad scale after 1993. In Japan, Du Pont-Mitsui Fluorochemicals is scheduled to build a mass-production plant for HFC-134a at its Chiba factory.

TOYOBO STARTS BUILDING PILOT PLANT FOR BIOTECHNOLOGY-APPLIED DRUGS

Toyobo Co. has begun constructing a pilot plant for producing biotechnology-applied drugs at the site of its Katada research laboratory in Shiga Prefecture. The plant is designed to produce, on an experimental basis, erythropoietin, 2nd-generation tissue plasminogen activator (TPA) and hepatic growth factor (HGF). These agents will be used for clinical tests and experiments conducted at laboratories.

The pilot-plant construction follows the construction last December of a commercial-scale plant for producing TPA via gene manipulation and a plant for formulating the TPA so produced. This former plant employs cell-cultivation tanks made by modifying the tanks used at the old pilot plant, in addition to two new 670-litre cultivation tanks. It thus became necessary to build a new pilot-scale plant to turn out test-use agents.

The new pilot plant worth about ¥1.5 billion will be provided with a variety of cultivation tanks with capacities ranging from 10 to 200 litres. It is scheduled to be completed by December.

COMBINED USE OF ANTI-
CANCER AGENT, INTERLEU
PROVES VERY EFFECTIVE

Ajinomoto Co. has confirmed
animal tests that the combined use o
"Lentinan" anticancer agent and in
luekin 2 (IL-2) agent brings about
complete involution of primary fo
and prevents its metastasis. Tests w
conducted on mice in which sarcom
cancer cells causing leukemia w
implanted.

This has produced evidence agai
the view that IL-2 itself is not effect
for cancer treatment. Experts have so
been divided over the efficacy of IL
The company will step up animal te
to the stage of applying triple treatm
using Lentinan, IL-2 and a chemoth
apeutic agent as well as undertake te
with retard naturally grown cancer

Lentinan is an immunotherapeu

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(KNS–ADI)

icancer agent first marketed by Ajin-
oto four years ago. It is used specif-
lly for treatment of gastric cancer.

IL-2 was jointly developed eight
ars ago by Ajinomoto and Japanese
undation for Cancer Research, utilis-
g a gene-manipulation technique. It
s been mass-produced via gene
combination.

Ajinomoto says that animal tests on
e two agents have offered important
ta with regard to their immunologi-
l actions of suppressing cancer
owth.

UTOMATED CHEMICAL EACTION CONTROL POSSIBLE ITH FUZZY EXPERT SYSTEM

Sogo Pharmaceutical Co. has devel-
ped, together with Assistant Professors
I. Anabuki and T. Kidokoro of Tokai
niversity, a desk top-type automated
action system ensuring easy control of
mperatures necessary for a variety of
emical reactions, aided by a central
rocessing unit and fuzzy-logic system.

The system is designed to automat-
ally produce any given chemical reac-
on in the same way as that carefully
ontrolled by skilled operators. This is
believed to open the way for facilitating the shift from laboratory tests to commercial-scale application with far less time and cost.

The company claims it will benefit many companies facing a shortage of personnel skilled in laboratory tests on various chemical reactions and their application to commercial production.

The system has controllers for both manual and automatic modes. In the manual mode, information on experimental reaction process temperature is stored in the controller time program.

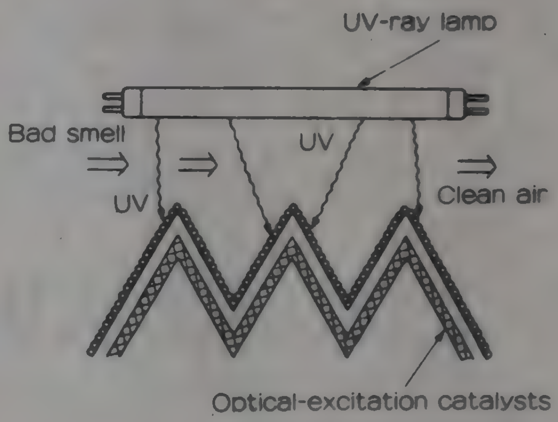
In the automatic mode, the temperature information stored in the time program in the manual mode can be utilised. And, in the automatic mode, the system is also operated in accordance with the temperature information on the time program by key entry.

OPTICAL-EXCITATION CATALYST USED AS POWERFUL DEODORANT

Nichias Corp. — together with Violet Co. Ushio Inc. — has developed an air cleaner using optical-excitation catalysts based on a honeycomb-structure carrier. The catalyst and carrier have been pioneered by Violet and Nichias, respectively. Ushio was in charge of the designing of the equipment.

The new product charges the energy of ultraviolet rays into chemical energy, thereby efficiently producing deodorising/sterilising effects.

Compared with active carbon-applied cleaners, it is compact and capable of ensuring deodorisation over a longer time.



Catalysts absorb ultraviolet ray energy and chemically decompose odor components on the surface of the catalysts themselves.

The new product is available in two types: one is usable for an 8-12-mat area (office use) and the other, a 3-6 mat area (household use).

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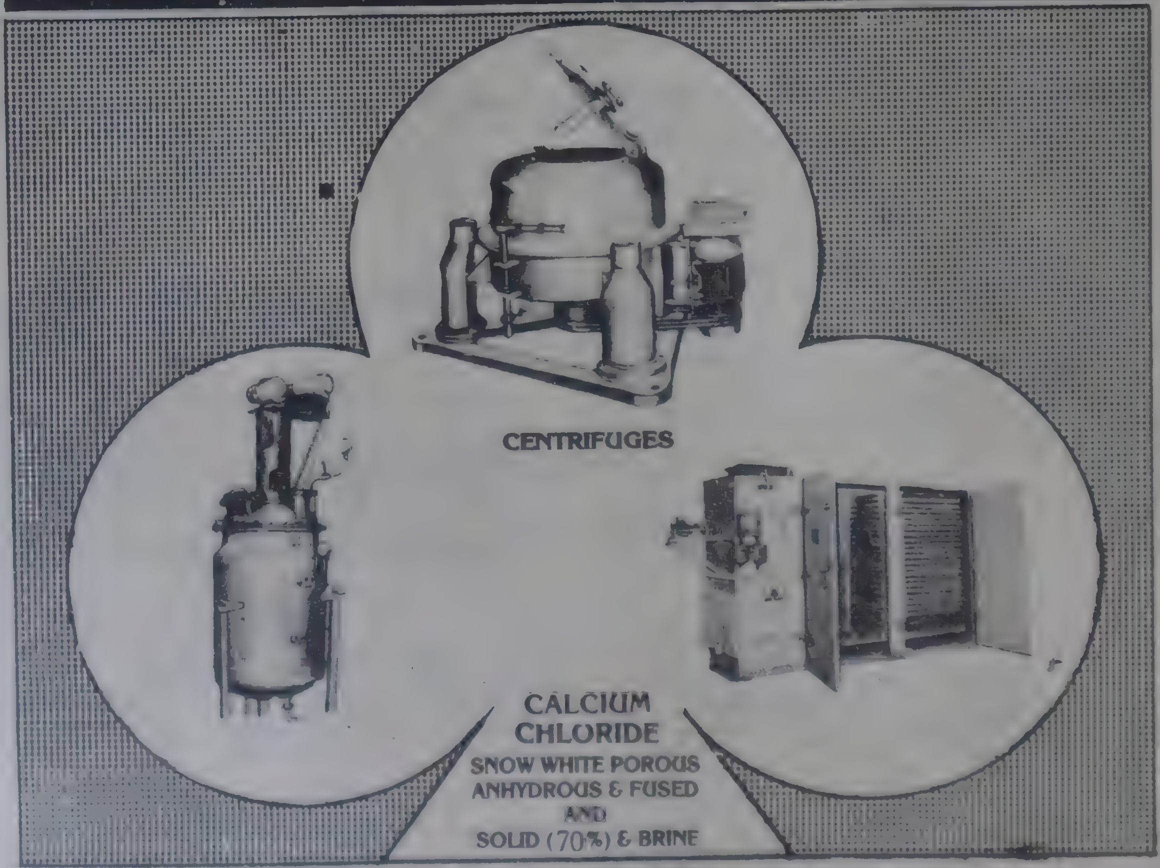

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MARKET INFORMATION

All Round Increases in Prices

Prices of major chemicals have ken an upswing. An unscheduled hutdown at NOCIL caused supplies dwindle pushing up the compa- y's products prices, chief among hem being ethyl acetate which went p to Rs. 22.50, diethyl glycol to Rs. 8, isopropyl alcohol to Rs. 38, ethy- ene glycol to Rs. 35. Price of hydro vent up to Rs. 45 following increase in manufacturers price by Rs. 2. Phthalic anhydride too firmed to Rs. 42 after manufacturers raised prices by Rs. 4. Shortage of imports slowly pushed price of Gohsenol GH-17 to Rs. 145 and PVA (No. 173) to Rs. 145. Prices of solvents also went up and is expected to rise further. Price of dye intermediates also registered increases.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent -- and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on September 3, 1990)

NDUSTRIAL CHEMICALS	Per Kg.
mmonium sulphate	2.50
mmonium phosphate (Mono)	14.50
mmonium phosphate (Di)	14.50
mmonium carbonate (Di)	17.00
mmonium bicarbonate	6.00
mmonium chloride	3.25
mmonium nitrate	6.00
rsenic white powder	22+ST
crylamide (Resale)	85.00
arium carbonate	20.00
leaching powder (33% Cl)	5.00
Borax (Granular)	16.00
Borax (Powder)	22.00
Boric acid (Tech)	32.00
Bisphenol-A	75.00
Butyl carbitol	106.00
Caustic soda (Flakes)	11.00
Caustic soda (Solid)	12.00
Caustic soda (Lye)	10.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	6.00
Calcium carbonate (Activated)	5.75
Cobalt oxide	550.00
Cresylic acid	62.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.) China	70.00
Citric acid (Belgium) (Resale)	47.00
Citric acid (Indian) (Resale)	41.00
Copper sulphate	24.00
Chromic acid	63.00
Ethylene urea	58.00
Ferric chloride (Lumps)	9.00
Ferric chloride (Anhydrous)	20.00
Glue flakes	15.00
Glue sheets	6.75
Gohsenol GH-17	145.00
Hydro	45.00

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Hyflosupercell	34.00
Hexamine (Resale)	34.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	39.00
Lithopone	32.00
Magnesium chloride (Crystal)	2.00
Menthol crystal (Flakes)	355+Ex+ST
Menthol bold	425+Ex+ST
Menthol crystal cold	395+Ex+ST
Magnesium carbonate (Japan)	30.00
Magnesium carbonate (Indian)	26.00
Maleic Anhydride (Resale)	39.00
Mercury (34.5 Kgs)	11,500.00
Nickel chloride	110.00
Oxalic acid (Resale)	15.00
Peppermint oil (Rectified)	188+Ex+ST
Potassium carbonate (Indian)	28.00
Potassium carbonate (Imported)	32.00
Potassium bichromate	38.00
Potassium phosphate (Mono)	34.00
Potassium phosphate (Di)	25.00
Polyvinyl alcohol (No. 117)	93.00
Polyvinyl alcohol (No. 173)	145.00
Polyvinyl alcohol (No. 208)	170.00
Paraformaldehyde (Resale)	20.50
Phthalic anhydride (Resale)	42.00
Pentaerythritol (Resale)	49.00
Paraffin wax	22+ST
Rangolite (German)	96+ST
Rangolite (Czech.)	72.00
Rangolite (China)	53.00
Sodium sulphate (Fine)	3.75
Sodium sulphate (Coarse)	3.50
Sodium sulphide 50-52% (Flakes)	11.50+ST
Sodium sulphide 58-60% (Flakes) (TCL)	25.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	1,300.00
Sodium chlorite 80% (Spain)	100+ST
Soda Ash (Tata)	5.00
Soda Ash (Birla)	5.00
Soda Ash (Imp.)	5.00
Sodium bicarbonate	7.00
Sodium bisulphite	8.00
Sodium silicate	5.50
Sodium acetate	7.20
Sodium alginate	450.00
Titanium Dioxide (Anatase)	65.00
Titanium Dioxide (Rutile -- RCR_2)	88+ST
Tartaric acid	190.00
Trisodium phosphate	12.00
Thiourea	78.00
Urea (Tech.)	3.00
Vacuum salt	1.00
Zinc Dust	52.00
Zinc Oxide	58.00
Zinc chloride powder (Tech.)	20.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	14.75
Acetic Anhydride (Resale)	33.50
Acetone (Resale)	22.50
Adipic Acid	90.00
Aceto Acetanilide	50.00
Aniline Oil (HOC)	46.00
Benzoate Plasticiser	62.00
Butyl Acrylate	84.00
Butyl stearate	38.00
Butanol	32.00
Benzyl Alcohol	60.00
Benzyl Chloride	34.00
Benzo trichloride	16.00
Benzoyl chloride	22.00
Bromine Liquid	68.00
Chloroform	30.00
Carbon Tetrachloride	20.00
Cellosolve	60.00
Cyclohexanone	64.00
Cyclohexanol	58+ST
Diacetone (Resale)	26.75
Diethyl Oxalate	34.00
Diethyl glycol (DEG) (Resale)	38.00
Dioctyl Phthalate	45.00
Diallyl Phthalate	42.00
Dimethyl Phthalate	28.00
Dioctyl Adipate	52.00
Dibutyl Adipate	42.00
Dipentene	15.00
Dimethylamine 40%	30.00
Dimethylamine 50%	35.00
Ethyl Acetate	22.50
Ethyl Acrylate	66.00
Ethylene Dichloride	18.50
Ethylene Glycol	35.00
Formic Acid (Imp.)	24.00
Formaldehyde (Resale)	6.50
Glycerine (CP)	48.00
Glycerine (IW)	55.00
Hydrogen Peroxide 50% (Resale)	38.00
Isopropyl Alcohol	38.00
Isobutyl Alcohol (Resale)	35.00
Monoethanolamine (Resale)	105.00
Melamine	60.00
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Para Dichloro Benzene (PDCB)	28.
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Para Amino Azo Benzene (India)	135.0
PNCB (HOC)	54.0
Para Amino Acetanilide	200.0
1-Phenyl 3-Methyl 5-Pyrazolone	135.0
Phenyl J. Acid	360.0
Para Amino Benzoic Acid	135.0
PT Base	122.0
Rhoduline Acid	520.0
Resist Salt 80%	28.0
Resorcinol	255.0
Sodium Naphthionate	65.0
5-Sulpho-Anthranilic Acid	82.0
Sulphanilic Acid	31.0
Sulpho Tobias Acid	140.0
Trichloro Benzene (TCB)	32.0
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(KNS-AD

Bombay Drugs Market

(Prices as on August 30, 1990)

Product	Rs./kg.	Product	Rs./kg.	Product	Rs./kg.
Acriflavine BPC	850.00	Disodium Hydrogen Citrate	43.00	Niacinamide	280.00
Aluminium Hydroxide IP	43.00	Ephedrine HCl	2000.00	Nifedipine	1100.00
Ampicillin Trihydrate	1750.00	Erythromycin Stearate	2100.00	Nitrofurazole	280.00
Aminophylline	350.00	Ethambutol IP	900.00	Oxyphenbutazone	585.00
Albendazole	2100.00	Ferrous Fumarate	40.00	Paracetamol	155.00
Analgin	280.00	Folic Acid IP	3200.00	Pectin IP	425.00
Aspirin IP	85.00	Furosemide IP	1900.00	Pepsin 1:3000	375.00
Atenolol	2850.00	Furazolidone IP	380.00	Phenbarbitone	510.00
Benzoic Acid IP	34.00	Guanidine Nitrate	40.00	Pheniramine Maleate	950.00
Bromhexine HCl	2400.00	Gallic Acid	285.00	Phenyl Butazone USP	310.00
Caffeine Citrate IP	360.00	Haloperidone	19,000.00	Piperazine Citrate	90.00
Caffeine IP	385.00	Hematropine Methyl Bromide	12.00	Potato Starch	65.00
CalciumGluconate IP	48.00	Hydrazine Hydrate	80.00	Propranolol HCl	1000.00
Calcium Glycerophosphate	160.00	Ibuprofen IP	370.00	Rifampicin IP	3900.00
Calcium Lactate	40.00	I.N.H.	270.00	Saccharine Sodium	215.00
Calcium Phenthonate	500.00	Inosite IP	900.00	Salbutamol Sulphate	7300.00
Cetrimide IP	210.00	Iodochloro	500.00	Sodium Iodide	425.00
Chloramphenicol Powder	1400.00	Lactose IP	35.00	Sodium Methoxide	96.00
Chlorbutol	95.00	Lactic Acid	90.00	Sorbitol Powder	115.00
Chlorhexidine Gluconate 20% BP	225.00	Lignocaine HCl	290.00	Sorbitol USP	13.00
Chloroquin Phosphate	850.00	Lignocaine Base	300.00	Sulphacetamide	300.00
Chlorpromazine HCl	1475.00	L.Lycine Feed	85.00	Sulphamethoxazole	305.00
Choline Chloride FG	35.00	L.Lysine Pharma	260.00	Tinidazole	350.00
Choline Chloride IP	55.00	Magaldrate IP	40.00	Theophylline Anh	390.00
Citric Acid IP	39.00	Magnesium Hydroxide	30.00	Trimethoprim IP	980.00
C.P.Maleate IP	1100.00	Magnesium Trisilicate IP	11.00	Vitamin A Palmitate	2600.00
Dexamethasone	95.00	Mannitol USP	100.00	Vitamin B6 Hydrochloride	1400.00
Dicyclomine HCl	1500.00	Mebendazole	550.00	Vitamin B2 5-Phosphate	4100.00
Diethyl Carbamazine Citrate	280.00	Mercurochrome NF	280.00	Vitamin C Plain	285.00
Di-iodohydroxyquinoline	570.00	Methyl Chloroformate	80.00	Vitamin C Coated	290.00
Diloxanide Fumarate IP	450.00	Metronidazole IP	415.00	Vitamin K3 W/S	675.00
Diphenhydramine HCl	310.00	Morpholine	140.00		

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Manufacturers:

M/s. SPARKEM

Bombay Dyes Market

(Prices as on September 3, 1990)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 38N	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.83
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc.	611.50
Red B 2B Conc.	797.90
Red CB Powder	1048.25
Red D2B Powder	580.65
Violet C 4R	1202.70
Blue BG Powder	580.65
Blue BN Powder	128.25
Blue D 2R Powder	588.25
Navy BT Conc.	531.95
Blue B 2G Conc.	577.95
Blue BT Conc.	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60
Red 2B	422.40
Red FB	425.80
Red Violet FBL	622.00
Orange 3R	254.20
Violet 3R	370.50
Violet RL	355.70
Violet 6R	638.20
Scarlet RR	283.50
Rubine 3B	289.10
Rubine CB	449.50
Blue GL	419.00
Blue BGF	805.80
Navy Blue RE	359.90
Brown 3REL	272.80
Black GEL	420.10
Dark Brown 3B	411.10

BASE COLOURS	Per Kg.
Fast Yellow GC	77.75
Fast Orange GC	128.40
Fast Scarlet R	198.05
Fast Scarlet RC	128.40
Fast Scarlet RCR	105.60
Fast Scarlet G	115.75
Fast Scarlet GN	92.95
Fast Scarlet GG	77.75
Fast Scarlet GGS	73.95
Fast Red B	233.50
Fast Red RC	115.75
Fast Red R Flakes	158.80
Fast Red TR	181.60
Fast Red TR Oil	223.35
Fast Red RL	251.20
Fast Red KB Oil	251.20
Fast Bordeaux GP	236.00
Fast Garnet GBC	103.05
Fast Violet B	548.80
Fast Blue BB	566.50

NAPHTHOL COLOURS	Per Kg.
ASG	301.85
AS	205.65
ASSW	379.10
ASBS	253.75
ASBO	266.40
ASD	209.45
ASOL	243.60

STR	369.00
SPH	336.05
SE	236.00
SEL	249.95
SLB	2,002.35
SBT	2,459.45
SWG	143.00
SSG	538.65
SSR	652.60

PROCION COLOURS	Per Kg.
Golden Yellow HR	207.95
Brill. Yellow H4G	145.65
Supra Yellow H-8GP	168.55
Brill. Yellow HE6G	214.75
Yellow G-E4R	276.05
Brill. Yellow H7G	332.30
Yellow M4R	275.45
Yellow M GR	387.65
Brill. Yellow M4G	201.15
Brill. Yellow M8G	366.10
Yellow M 3R	244.70
Brill. Orange H 2R	303.80
Brill. Red H 7B	157.95
Brill. Orange M 2R	313.15
Brill. Red H 8B	213.55
Brill. Scarlet H RN	245.05
Supra Red H-3BP	179.80
Brill. Red H-F3B	243.45
Brill. Magenta HB	182.00
Brill. Red M 5B	160.05
Brill. Red M 8B	218.35
Brill. Pink MB	137.10
Brill. Magenta MB	163.65
Brill. Purple H-3R	219.55
Brill. Purple H-7R	175.40
Navy Blue H 3R	333.75
Brill. Blue H-GR	406.40
Brill. Blue H 5G	207.95
Blue H 5RX	286.20
Brill. Blue H 7G	213.95
Brill. Blue H 7RX	358.15
Turquoise HA	265.05
Supra Blue H-3RP	595.30
Supra Turquoise H 2G P	181.50
Blue H-FRD	305.80
Navy Blue H ER	333.75
Blue H 5RX	286.20
Navy Blue M 3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H 4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Con.	818.60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp.	693.85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp	867.45
Brill. Purple 3R Acra Powder	827.05
Brill. Purple 2R Hly. Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Pdr. Fine	675.30
Blue BC Acra Conc. Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr.	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Pdr. Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779.85
Brown R Pdr. Fine	869.45
Dark Brown 3R Fine	826.25
Brown G Supra Disp.	582.05
Brown 2G Supra Disp.	716.10
Brown R Supra Disp.	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	529.60
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	415.75
Direct Black AC Pdr. Fine	574.70
Direct Black CH Supra Disp.	490.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: AUGUST 31 NNS In the absence of arrivals from Sambhal, Rampur, Chandausi, Amroha and Moradabad in view of anti reservation stir, prices of menthol medium and bold hardened by Rs. 5/10 at Rs. 310 and Rs. 335 per kg respectively in the Delhi chemicals market last week, reports NNS. Mentha oil declined from Rs. 198 to Rs. 193 in the early part of the week, but later, in view of rise in demand from consumers it moved up and finally settled at Rs. 200. DMO remained firm at Rs. 90/92 per kg.

Following fall in import from Japan caused by tension in Gulf countries combined with sustained demand from favicol manufacturers, GH-17 shot up from Rs. 122 to Rs. 135 per kg. Rangolite Germany flared up by Rs. 2 at Rs. 87 on account of good demand from gur and khandsari manufacturers. Following acute shortage of stock and increased stocking monopoly between stockists and manufacturers, prices of sodium hydro sulphite Damosha, Tamil Nadu and Kalali moved up by 50 paise/Re. 1 at Rs. 40 and Rs. 42 per kg. Gulshan hydro also quoted higher by 50 paise at Rs. 38.50.

As a result of dwindling supply, coupled with spurt in demand from plastic and paint units, titanium dioxide TTP jumped up from Rs. 62 to Rs. 65 per kg. Diwali delivery transactions were quoted ai Rs. 66 against Rs. 62. RC-822 titanium moved up from Rs. 86 to Rs. 89. Similarly RCR-2 and K-brand rose from Rs. 92 and Rs. 58 to Rs. 95 and Rs. 62. Hydrogen peroxide hardened by Re. 1 at Rs. 37.50. Caustic soda flakes, on the other hand, slipped by Rs. 15 at Rs. 515 per Katta, in view of accumulation of stock. Ammonia bicarb drifted lower by Rs. 5 at Rs. 150 per kg.

Chatkolite and sufolite eased slightly by Re. 1 each at Rs. 53 and Rs. 54 for want of buying support by local and outstation buyers. Sodium nitrite suffered a set back of Rs. 50 at Rs. 1000/1100, on account of better stock position, while boric acid technical registered a sharp rise of Rs. 75 at Rs. 1600 in view of negligible supply and acute shortage of stock. As a result of dwindling supply, borax granular and crystal advanced sharply by Rs. 15/35 at Rs. 815 and Rs. 860 per 50 kg.

(DELHI MARKET RATES AS ON AUGUST 31, 1990)

Ammonia Bicarb (Per 25 Kg.)	150.00	Tartaric acid France (Per Kg.)	300.00
Mercury (Per flask)	11,200.00	Sufolite (Per Kg.)	53.00
Soda ash (Per bag)	360/373.00	Chatkolite (Per Kg.)	54.50
Ammonium Chloride (50 Kg.)	120/180.00	DMO (per Kg.)	90.00
Caustic soda flakes (50 Kg.)	515.00	Boric acid Technical (Per 50 Kg.)	1,600.00
Citric acid (Per 50 Kg.)	1,900/2,350.00	Paraffin Wax (Per 50 Kg.)	1,110.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	101.00	Slack wax (Per metric tonne)	11,600.00
Stable Bleaching Powder KCl (Per 25 Kg.)	90.00	Tartaric Acid (Swastik Per Kg.)	225.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	91.00	Borax Granular (Per 50 Kg.)	800.00
Stable Bleaching Powder Modi (Per 25 Kg.)	92.00	Borax Crystal (Per 50 Kg.)	825.00
Sodium Bicarbonate (50 Kg.)	315/320.00	Sodium Nitrite (Per 50 Kg.)	1,000/1,100.00
Sodium Hydrosulphite (Per Kg.)	38.50/42.00	Sodium Nitrate (Per 50 Kg.)	500.00
Rangolite (Per Kg.)	87.00	Camphor Thal (Per Kg.)	110.00
		Camphor Powder (Per Kg.)	96.00
		Menthol Bold (Per Kg.)	335.00
		Menthol Medium (Per Kg.)	310.00
		Menthol Flake (Per Kg.)	288.00

Mentha Oil (Per Kg.)	200.0
Glycerine (Per Kg.)	55/58.0
Sodium Silicate (Per quintal)	300/400.0
Hexamine (Per Kg.)	34.0
Acetic Acid Glacial (Per Kg.)	13.7
Copper Sulphate (Per quintal)	2,300/2,60
Formic Acid (Per Kg.)	24.0
Formaldehyde (Per Kg.)	8.5
Hydrogen Peroxide (Per Kg.)	37.5
Calcium Carbonate (Per Tonne)	2,800/5,80
Acid Slurry Soft (Per Kg.)	27.0
Acid Slurry Hard (Per Kg.)	32.0
Phosphoric Acid (Per 50 Kg.)	1,235.0
Potassium Nitrate (Per quintal)	1,000/1,250.0
Potassium Permanganate (Per 50 Kg.)	2,600/3,000.0
Sodium Bichromate (Per 50 Kg.)	1,575/1,600.0
Trisodium Phosphate (50 Kg.)	570.0
Titanium Dioxide Anatase T.T.P (Per Kg.)	65.0
Titanium Dioxide RC-822 (Per Kg.)	89.0
Titanium Dioxide Anatase K-Brand (Per Kg.)	62.0
Titanium Dioxide RCR-2 (Per Kg.)	N.A
Zinc Oxide (Per Kg.)	46.00/50.0
Phenol Carbolic Acid (Per Kg.)	39.0
Carbon Tetrachloride (Per Kg.)	24.7
Chloroform (Per Kg.)	28.0
Sodium Sulphate (Per metric tonne)	3,600/3,900.0
Naphthalene Balls (Per 50 Kg.)	1,350.0
Match Wax	19,00
Residue Wax	3,80

DYES & COLOURS	(Per Kg
Naphthol AS	175/211.
Naphthol ASG	180/249.
Naphthol ASBS	210/260.
Naphthol ASTR	300/378.
Naphthol ASOL	210/250.
Naphthol ASBO	195/274.

DIRECT DYES	(Per Kg
Black E. Conc.	120/185.
Diazo Black B.T.	105/154.
Green B	90/147.
Blue 2-B	60/107.
Blue 2-B 225% (JNR)	125.
Sky Blue FB	160/248.
Basic Auramine	55/110.
Basic Rhodamine	300/425.
Basic Methylene Blue	100/180.
Basic Violet	165/210.
Basic Malachite Green	175.
Acid Orange	75/111.
Congo Red H/C	75/120

Madras Market

Market witnessed an upward rend in the prices of most of the ems excepting inorganic chemicals. Hydrogen peroxide prices went up to Rs. 40 per kg due to restricted avai- ability. Phthalic anhydride prices ave also gone up to Rs. 38 and onsequently the prices of DOP and DBP have also gone up. MEK was nder short supply.

Customers who have been dependent on imported supplies have been worst affected as overseas supplier are not making any offer for petrochemical based products in view of the Gulf situation and it is apprehended this may set a chain reaction and tend to put up the prices of various commodities in the coming weeks.

CALCUTTA MARKET
(Prices as on Sep. 2, 1990)

Acetic acid (per 50 kg)	750.00
Basic chrome sulphate (per 50 kg)	800.00
Benzene (litre)	11.50
Bleaching powder (bag)	235.00
Borax granular (per 50 kg)	800.00
Boric acid (per 50 kg)	1,625.00
Camphor (per kg)	102.00
Caustic soda lye (per ton)	10,020.00
Caustic soda flakes (per 50 kg)	560.00
Glycerine (per kg)	53.50
Menthol bold (per kg)	570.00
Menthol medium (per kg)	380.00
Menthol small (per kg)	300.00
Phosphoric acid (per 50 kg)	1,400.00
Phenol (per kg)	38.50
Soda ash (75 kg)	395.00
Sodium bichromate (per 50 kg)	1,500.00
Sodium bicarbonate (per 50 kg)	340.00
Sodium nitrate (per 50 kg)	450.00
Sodium sulphate anhydrous (per 50 kg)	320.00
Sulphuric acid (per ton)	2,200.00
Trisodium phosphate (per 50 kg)	610.00
Toluene (litre)	16.50

(MADRAS MARKET RATES AS ON SEPTEMBER 1, 1990)

Acetic Acid Glacial (per kg)	15.00
luminium Sulphate Iron free (per MT)	4,000.00
Ammonium Bicarbonate (per 25 kgs)	150.00
Ammonium Chloride (per MT)	2,450.00
Acid Slurry (per kg)	31.00
Barium Carbonate (per kg)	11.00
Barium Chloride (per kg)	10.00
Boric Acid Technical (per kg)	26.00
Bleaching Powder (per 50 kgs)	210.00
Borax (per 50 kgs)	785.00
Caustic Soda Flakes -- Mettur Chemicals (per MT)	11,500.00
Caustic Soda Flakes -- Andhra Sugars (per MT)	11,500.00
Calcium Chloride 70% Solid (per MT)	3,800.00
Calcium Chloride Anhydrous (per MT)	6,500.00
Calcium Carbonate (Activated) (per MT)	6,750.00
Calcium Carbonate (Precipitated) (per MT)	5,600.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	22.00
Cresylic Acid 98-99% (per kg)	135.00
Pure Para Cresol 96% (per kg)	86.00
Meta Para Cresol 42% (per kg)	51.00
Formic Acid (per kg)	26.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine I.W. (per kg)	49.00
Hydrosulphite of Soda (TCPL) (per kg)	38.00
Hydrosulphite of Soda (BASF) (per kg)	48.00
Hexamine (per kg)	31.50
Hyflosupercell (per kg)	23.00
Hydrogen Peroxide (per kg)	40.00
Litharge (per kg)	38.00
Lead Acetate (per kg)	38.00
Magnesium Carbonate (per kg)	16.00
Magnesium Chloride (per kg)	3.90
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	345.00
Oxalic Acid (per kg)	20.00
Paraffin Wax (per kg)	18.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	27.00
Polyvinyl Alcohol Powder (per kg)	145.00
Pentaerythritol (per kg)	52.00
Phthalic Anhydride (per kg)	38.00
Soda Ash (TAC) (per 75 kgs)	410.00
Soda Ash (TATA) (per 75 kgs)	410.00
Sodium Bicarbonate (TATA) (per 50 kgs)	385.00
Sodium Silicate (per MT)	3,800.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	24.00
Sodium Sulphide Flakes (per kg)	18.00
Sodium Bisulphite (per kg)	8.00
Sodium Alginate (per kg)	295.00
Sodium Acetate (per kg)	7.50
Sodium Sulphate (Anhydrous) (per kg)	3.85
Titanium Dioxide (Anatase) (per kg)	62.00
Titanium Dioxide (Rutile) (per kg)	85.00
Trisodium Phosphate (per kg)	10.00
Urea (Technical) (per kg)	3.00
Zinc Chloride Powder (per kg)	14.00
Zinc Sulphate (per kg)	9.00

SOLVENTS

Acetone -- HOCL (per kg)	18.50
Butanol (per kg)	35.00
Butyl Acetate (per kg)	42.00
Benzene (per lit)	14.00
Cellosolve (per kg)	65.00
Carbon Tetra Chloride (per kg)	23.00
Chloroform (per kg)	28.00
Diacetone Alcohol (per kg)	30.00
Diethylene Glycol (per kg)	30.00
Dichloroethane (per kg)	18.00
Di-octyl Phthalate (per kg)	48.00
Di-N-butyl Phthalate (per kg)	48.00
Ethyl Acetate (per kg)	18.00
Isopropyl Alcohol (per kg)	28.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	23.00
Methyl Ethyl Ketone (per kg)	38.00
Methyl Isobutyl Ketone (per kg)	40.00
Phenol (per kg)	38.00
Sorbitol (per kg)	15.00
Triethanolamine (per kg)	95.00
Trichloroethylene (per kg)	26.50
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	16.00
Toluene (per lit)	14.00

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Approx sailing d (5)
12/9	Eagle Nova (Voy-020)	F.F.C. Co.	Los Angeles (Harbour); Longbeach; San Francisco; Oakland; Seattle; Vancouver (B.C.); Portland; New York; Boston; Norfolk; Baltimore; Charleston; Savannah; Miami; New Orleans; Houston; Montreal; Toronto; Fortworth; Chicago; Nashville; Atlanta; Philadelphia; Milwaukee; Kansas City; Phoenix; Guam; Dallas; Cleveland; St. Louis; Cincinatti; Denver; Louisville; Memphis Wilminghton (B.C.); San Diego; Minneapolis; Indianapolis & Central American Ports; Honolulu. (Carting at Timber Pond No. 1).	18/9
9/9	Maersk Clementine (Sing) (V-9018)	Maersk Agency	New York; Philadelphia; Baltimore; Norfolk; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston; Toronto; Montreal; Chicago; Atlanta; Denver; Dallas; Wilmington; Milwaukee; Detroit; Minneapolis; Memphis; Nashville; Cleveland; Phoenix; Boston; Los Angeles; Vancouver; Seattle; San Franscisco; Portland; Longbeach; Mexican & S. American Ports. (Carting at M.O.D. No. 2).	13/9
10/9	Vega (V-16A/B)	O.S.A.	New York; Baltimore; Philadelphia; Houston; Boston; Chicago; Dallas; Atlanta; Savannah; Norfolk; Charleston; Los Angeles; San Francisco; Oakland; Seattle; Vancouver; Toronto; Montreal; Portland; Tacoma & S. American & W. Indies Ports. (Carting at M-178/180 Cotton Depot).	15/9
15/9	Olandia	Samrat/ Hindustan/ L. Triest	Boston; New York; Baltimore; Norfolk; Charleston; P. Mouth; P. Lauderdale; Miami; New Orleans; Savannah; Jacksonville; P. Everglades; Philadelphia; Halifax; Montreal; Toronto; & S. American Ports. (Carting at M.O.D. No. 1 for Samrat and Hindustan) (Carting at M-171/173 C.D. for L. Triest).	20/9
20/9	Hoegh Dyke	Patvolk	Montreal & Toronto via Halifax; New York; Boston; Norfolk; Charleston; Houston; Savannah; Wilmington; Philadelphia; Baltimore; New Orleans; & FCL Chicago; Milwaukee; Atlanta; Dallas. (Carting at H.B. No. 5).	25/9
28/9	Stonewall Jackson (Ame)	M.S.P.L.	Philadelphia; Baltimore; Norfolk; New Orleans; Houston; Savannah; New York. (Carting at P/Q-PD).	29/9
9/9	Maersk Clementine	Maersk Agency	Lagos/Apapa; Dakar; Freetown; Monrovia; Lome; Cotonou; Douala; Tema. (Carting at M.O.D. No. 2).	13/9
15/9	Olandia	L. Triest	With T.P. Lagos/Apapa; Abidjan; Dakar; Douala; Cotonou; Nouakchott; Libreville; Tema; Matadi; Conakry; Freetown. (Carting at M-171/173 Cotton Depot).	20/9
28/9	Stonewall Jackson	M.S.P.L.	Assab; P. Suez; (Alexandria). (Carting at P/Q-PD).	29/9
5/9	Baltik (Yug)	Oceanic	Hodeidah; Jeddah; P. Said; Rijeka.	15/9
12/9	Eagle Nova	F.F.C. Co.	Jeddah; P. Sudan; Hodeidah. (Carting at Timber Pond No. 1)	18/9
9/9	Maersk Clementine	Maersk Agency	Leghorn; Marseilles; Naples; Barcelona; Bilbao; Bordeaux; Alicante; Genoa; Valencia; Bremen; Jeddah; Antwerp; Rotterdam; Bremerhaven; Hamburg; U.K. & Scandinavian Ports. (Carting at M.O.D. No. 2).	13/9
15/9	Olandia (Ger)	Samrat/ Hindustan	Felixstowe; Hamburg; Rotterdam; Also London; Liverpool; Leixoes; Lisbon; Manchester; Avonmouth; Wembly; Birmingham; Liecester; Le Havre; Bremen; Amsterdam; Antwerp; Copenhagen; Leeds; Aarhus; Gothenburg; Oslo; Helsinki; Stockholm; Belfast & all destination in U.K.; Benelux; Germany; Italy; France; Switzerland; & Austria; Barcelona; Marseilles; La Spezia; Livorno; (Leghorn); Genoa; Naples and other Italian ports and FCL only Beirut; Alexandria; Valletta; Lattakia; Mersin. (Carting at M.O.D. No. 1 for Samrat and Hindustan).	20/9
		Killick	Felixstowe; Rotterdam; Hamburg; Antwerp; Le Havre; Lisbon; Leixoes; London; Liverpool; Manchester; Bristol; Avonmouth; Leeds; Glasgow; Tilbury; Birmingham; Dublin; Belfast; Bremen; Bremerhaven; Aarhus; Copenhagen; Gothenburg; Helsinborg; Oslo; Helsinki; Alexandria; Lattakia; Mersin; Malta; Limmassol; Piraeus. (Carting at E-Shed Grain Depot).	
		L. Triest	Barcelona; Marseilles; Genoa; Leghorn; La Spezia; Naples with TP Trieste; Venice; Ravenna; Bari; Koper; Rijeka; Las Palmas; Santacruz;	

1)	(2)	(3)	(4)	(5)
			De Teneriffe; Malta; Limmassol; Alexandria; Tunis; Algiers; Tripoli; Benghazi. (Carting at 171/173 Cotton Depot).	
2/9	Eagle Nova	F.F.C. Co.	Colombo; Rangoon. (Carting at Timber Pond No. 1).	18/9
28/9	Stonewall Jackson	M.S.P.L.	Singapore; P. Kelang. (Carting at P/Q-PD).	29/9
/9	Jala Govind (Ind)	S.C.I.	Singapore; Main Japan Ports. (Carting at B. Pier Extn.).	14/9
2/9	Eagle Nova (V-020) (Ger)	F.F.C. Co.	Penang; P. Kelang; Singapore; Bangkok; Jakarta; (T. Priok); Hongkong; Manila; Busan; Keelung; Kaohsiung; Kobe; Yokohama; Nagoya; Osaka; Tokyo; Tsingtao; Dairen; Quangzhou; Whampoa; Shanghai; Hsingkang. (Carting at Timber Pond No. 1).	18/9
9/9	Maersk Clementine (Sing)(V-9018)	Maersk Agency	Penang; Singapore; Hongkong; Keelung; Kaohsiung; Busan; Main Japan Ports; Manila; Jakarta; Surabaya; Bangkok; P. Kelang; Chinese Ports. (Carting at M.O.D. No. 2).	13/9
10/9	Vega (V-16A/B)	O.S.A./	P. Kelang; Singapore; Kaohsiung; Hongkong; Bangkok; Kobe; Yokohama; Nagoya; Moji; Osaka; Busan; Tokyo; Simizu; Keelung; Tsingtao; Quindao; Xiangang; Shanghai. (Carting at M-178/180 C.D.).	15/9
		M.S.P.L.	Singapore; Bangkok; P. Kelang; Penang; Jakarta; Ho Chi Minh. (Carting at E-Grain Depot).	
12/9	Eagle Nova	F.F.C. Co.	Brisbane; Fremantle; Sydney; Melbourne; Adelaide. (Crtg. at T.P. No. 1).	18/9
10/9	Vega	O.S.A.	Sydney; Melbourne; Adelaide; Brisbane; Fremantle; Auckland; Wellington; Lyttelton; P. Chalmers. (Carting at M-178/180 Cotton Depot).	15/9
12/9	Eagle Nova (V-020)	F.F.C. Co.	Dubai; Sharjah; Abu Dhabi; Doha; Muscat; Dammam; Riyadh; Bahrain. (Carting at Timber Pond No. 1).	18/9
9/9	Maersk Clementine	Maersk Agency	Dubai; Dammam; Muscat; Bahrain; Riyadh; Doha. (Carting at M.O.D. No. 2).	13/9
15/9	Dominator	J.M. Baxi	Bandar Abbas.	20/9
11/9	K. Medvetskiy (V-16)	Sai Ship	Mogadiscio; Mombasa; Dar Es Salaam; Beira; Maputo.	16/9

VESSELS DUE FOR IMPORT DISCHARGE

Due Date	Steamer's Name	Agents	From
20/9	Hoegh Dyke	Patvolk	U.S.A.
16/9	Marina Mistral	S.W. & Co.	U.S./Canada
15/9	Olandia	Samrat	U.K. Cont.
28/9	Stonewall Jackson	M.S.P.L.	U.S.A.
12/9	Virpazar	Sai Ship	U.K. Cont.

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Materials Exported/Imported

DYE MATERIALS EXPORTED BOMBAY (17.2.90)

ACID MILLING MAROON V: To Busan: Shidimo Interaux Pvt. Ltd., 350 Kgs., Rs. 66,383.

BENZAZOL BLACK BC: To La Spezia: Chemiequip Ltd., 2,000 Kgs., Rs. 7,07,660.

BENZASOL TURQUOISE BLUE GC: To Antwerp: Chemiequip Ltd., 500 Kgs., Rs. 59,813; 2,000 Kgs., Rs. 2,36,298.

BLUE 2B EXTRA HIGH CONC.: To Jakarta: Indokem Ltd., 250 Kgs., Rs. 14,894.

BLUE FFG EX CONC.: To Bangkok: Colour Chem Ltd., 200 Kgs., Rs. 14,104.

CHEMICTIVE YELLOW HE 4R: To La Spezia: Chemiequip Ltd., 2,000 Kgs., Rs. 2,96,170.

CHEMICTIVE RED HE 38: To Antwerp: Chemiequip Ltd., 500 Kgs., Rs. 88,613; 1,000 Kgs., Rs. 1,77,812.

CHRYSOPHENINE G EXT. CONC.: To Jakarta: Indokem Ltd., 750 Kgs., Rs. 67,617.

DIRECT BLUE 86: To Rotterdam: Indo Dyes Chemical Inds., 1,500 Kgs., Rs. 1,03,630.

DIRECT BLACK 38 (G): To Rotterdam: Monarch Dyestuffs Inds., 500 Kgs., Rs. 50,100.

DIRECT BLACK 38 (R): To Rotterdam: Monarch Dyestuffs Inds., 3,000 Kgs., Rs. 2,86,573.

DYES: To Antwerp: Metro Chem Inds., 5,000 Kgs., Rs. 8,76,272; To Chicago: Golden Dyes Corpn. (India) P. Ltd., 500 Kgs., Rs. 1,07,500; To Felixstowe: Indian Dyestuff Inds. Ltd., 500 Kgs., Rs. 1,42,000; To Hamburg: K. Patel Chemo Pharma P. Ltd., 1,050 Kgs., Rs. 2,35,000; Kantilal Sanghvi & Co., 2,500 Kgs., Rs. 2,31,087; 2,500 Kgs., Rs. 2,31,087; 2,000 Kgs., Rs. 2,20,000; Metro Chem Inds., 1,000 Kgs., Rs. 2,82,077; Mivin Overseas Corpn., 2,000 Kgs., Rs. 3,06,383; To Hodeidah: Multi Trade Enterprise, 30,000 Kgs., Rs. 1,84,000; To Jakarta: Little & Co., 2,030 Kgs., Rs. 2,60,327; To Jeddah: Ashrafi Exports, 840 Kgs., Rs. 75,700; To Keelung: Archana Finance Corporation, 5,000 Kgs., Rs. 5,30,000; Ashish Chemicals, 1,000 Kgs., Rs. 1,18,148; 1,000 Kgs., Rs. 1,18,148; To La Spezia: Chemiequip Limited, 1,000 Kgs., Rs. 1,56,596; To Le Havre: Jindal Dye Intermediates P. Ltd., 1,000 Kgs., Rs. 2,60,603; To Liverpool: Ravi Chem Dye, 7,000 Kgs., Rs. 5,23,864; To Rotterdam: Jaysynth Dyechem Ltd., 1,500 Kgs., Rs. 3,80,762; To Rotterdam: Indian Dyestuff Inds., 1,000 Kgs., Rs. 2,37,000; Monarch Dyestuff Inds., 2,250 Kgs., Rs. 2,05,411; Ravi Chem Dye, 500 Kgs., Rs. 73,200; 700 Kgs., Rs. 2,66,437.

DYE INTERMEDIATES: To Antwerp: Bubna Enterprises, 12,692 Kgs., Rs. 11,47,294; To Busan: Priya Electronics & Chemicals, 14,973 Kgs., Rs. 11,77,489; 1,069 Kgs., Rs. 84,106; To Genoa: Liberty Exports Ltd., 3,800 Kgs., Rs. 2,31,489; To Houston: Indian Dyestuff Industries, 1,000 Kgs., Rs. 1,78,000; To New York: Gujarat Dyestuff Industries, 19,251 Kgs., Rs. 15,51,183; To Rotterdam: Amritlal Chemaux Ltd., 500 Kgs., Rs. 90,320.

FAST RED B BASE: To Hamburg: RD Enterprise, 1,000 Kgs., Rs. 1,45,000.

GREEN FB EX. CONC.: To Bangkok: Colour Chem Ltd., 200 Kgs., Rs. 17,847.

INDIAN METANIL YELLOW: To Djibouti: Esufali Akbarali & Co., 2,000 Kgs., Rs. 73,000.

INDANTHRONE CRUDE: To Liverpool: Atic Inds. Ltd., 950 Kgs., Rs. 5,38,653.

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LEATHER BLACK TU: To Rotterdam: Karsandas Mavji, 1,000 Kgs., Rs. 1,00,468.

NAVINON BLACK BB M/F: To Rotterdam: Mangalya Trading & Investment, 2,000 Kgs., Rs. 5,57,000.

NAVINON DARK BLUE DO M/F: To Rotterdam: Indian Dyestuff Inds. Ltd., 1,000 Kgs., Rs. 2,81,000.

NAVINON DARK DO M/F: To Rotterdam: Mangalya Trading & Investment, 1,000 Kgs., Rs. 3,16,000.

NAVY BLUE FBR EX CONC.: To Bangkok: Colour Chem Ltd., 50 Kgs., Rs. 6,248.

ORANGE F 5G: To Penang: Colour Chem Ltd., 500 Kgs., Rs. 38,833.

ORANGE FR: To Bangkok: Colour Chem Ltd., 200 Kgs., Rs. 17,336.

PROCION BLUE MX 4GD: To Liverpool: Atic Inds. Ltd., 1,300 Kgs., Rs. 2,69,672.

PROCION VIOLET B-3R: To Liverpool: Atic Inds. Ltd., 5,000 Kgs., Rs. 15,97,289.

PHTHALOCYANINE GREEN GN: To Singapore: Colour Chem Ltd., 2,000 Kgs., Rs. 3,27,319; To Bangkok: Colour Chem Ltd., 900 Kgs., Rs. 1,35,404.

RH-ACID MIN. 75%: To Rotterdam: Sapna International, 2,769 Kgs., Rs. 2,94,800.

REACTIVE DYES: To Rotterdam: Karsandas Mavji, 3,000 Kgs., Rs. 3,03,966.

REACTIVE LEMON YELLOW H-4G: To Busan: Space Intl., 2,500 Kgs., Rs. 3,53,191.

REACTIVE ORANGE 16: To Charleston: Priya Electronics & Chemicals, 1,000 Kgs., Rs. 1,22,457.

REACTIVE RED 141: To Antwerp: J.K. Promotions, 1,000 Kgs., Rs. 1,82,380.

REACTIVE TURQUOISE BLU HA: To Rotterdam: Mivin Overseа Corpn., 1,000 Kgs., Rs. 2,02,906.

REACTIVE VIOLET 5R 140%: T Rotterdam: Metro Chem Inds., 1,00 Kgs., Rs. 1,79,489.

RED 12 B: To Jakarta: Indokem Lt 250 Kgs., Rs. 28,596.

RED FBR EX CONC.: To Hon Kong: Colour Chem Ltd., 6,425 Kg Rs. 7,29,680; To Penang: Colour Che Ltd., 200 Kgs., Rs. 25,859.

RUBINE TONEER C 68: To Po Kelang: 200 Kgs., Rs. 21,106.

REMAZOL BLACK: To Charle ton: Colour Chem Ltd., 6,000 Kg Rs. 5,69,872.

SKY BLUE FR SPL: To Jakar Indokem Ltd., 300 Kgs., Rs. 26,29

ULTRAMARINE BLUE: To Dub Mepsons, 564 Kgs., Rs. 26,000.

VAT GREEN: To Rotterda French Dyes & Chemicals P. L 1,000 Kgs., Rs. 1,19,700.

VIOLET FFR EX CONC.: Bangkok: Colour Chem Ltd., 50 K Rs. 5,695.

VALI ACTIVE TURQUOI BLUE G: To Hamburg: Valia Expo 1,000 Kgs., Rs. 1,23,000.

VINYL SULPHONE: To Rotterd Liberty Exports Ltd., 21,276 K Rs. 18,96,170.

VIOLET B SPECIAL: To Jaka Indokem Ltd., 600 Kgs., Rs. 90,0

MATERIALS IMPORTED BOMBAY
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ACRYLAMIDE: From Japan: F lite Auxiliaries, 3 Mts., Rs. 78, From Japan: Suyog Chemicals Pvt. 5,000 Kgs., Rs. 1,30,886.

ALDEHYDE C12 LAURIC: Germany: J.B. Perfumes P. Ltd., Kgs., Rs. 71,165.

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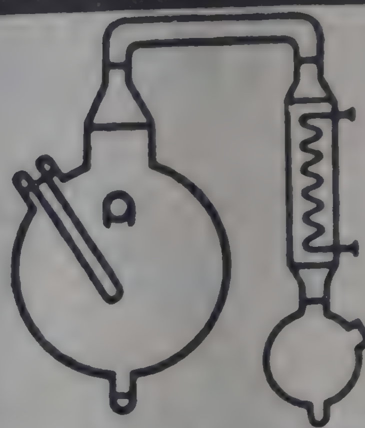

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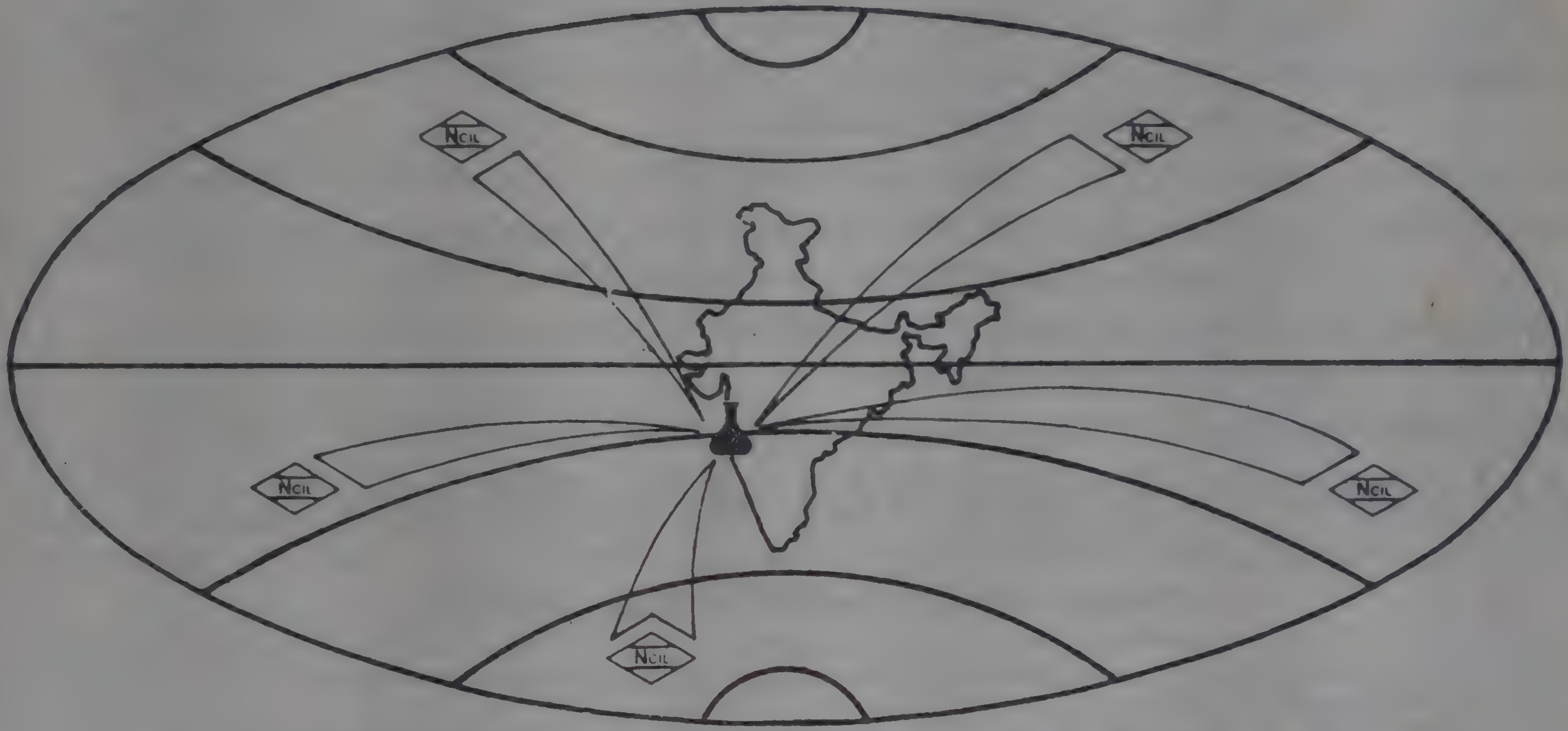

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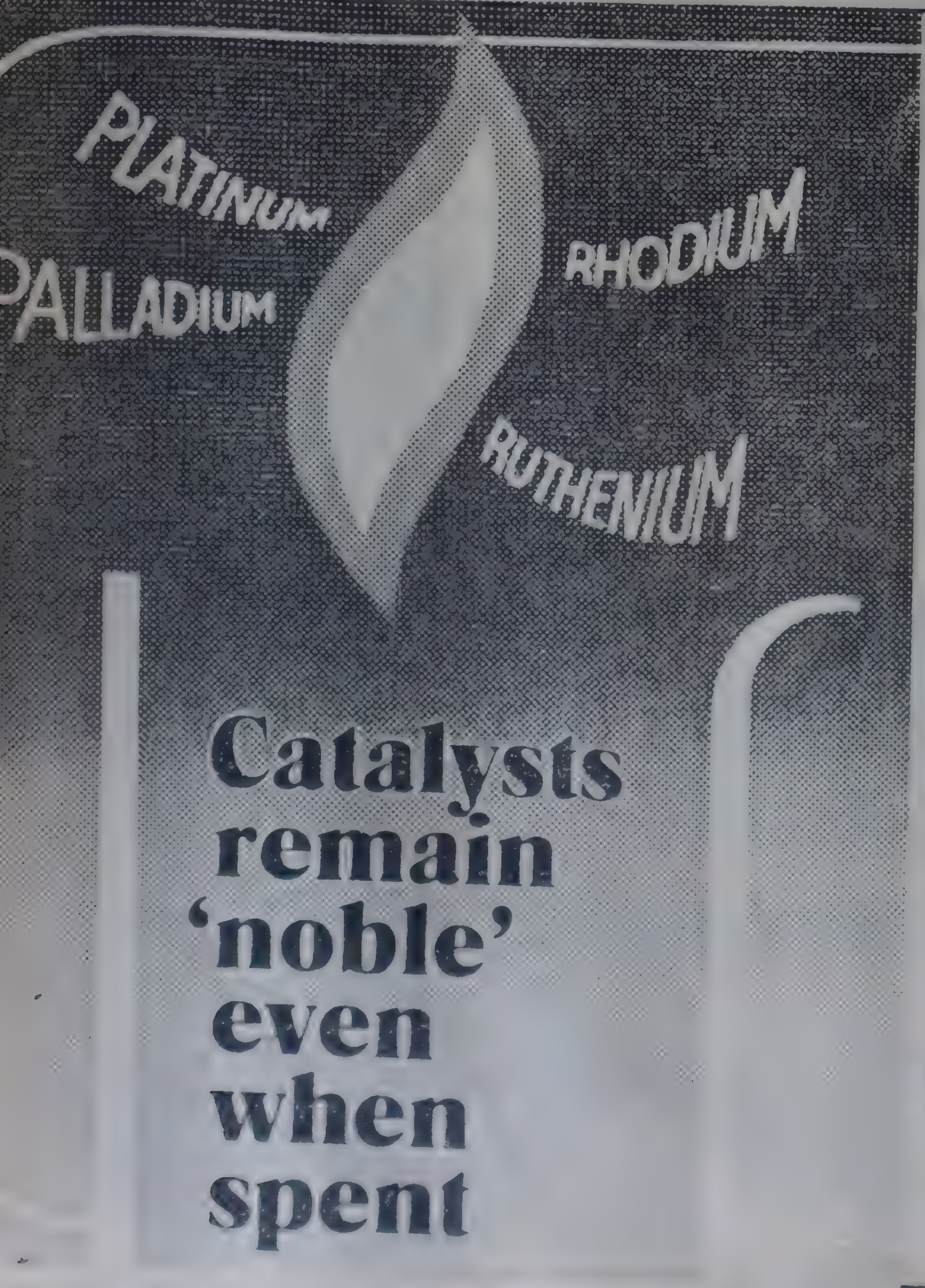

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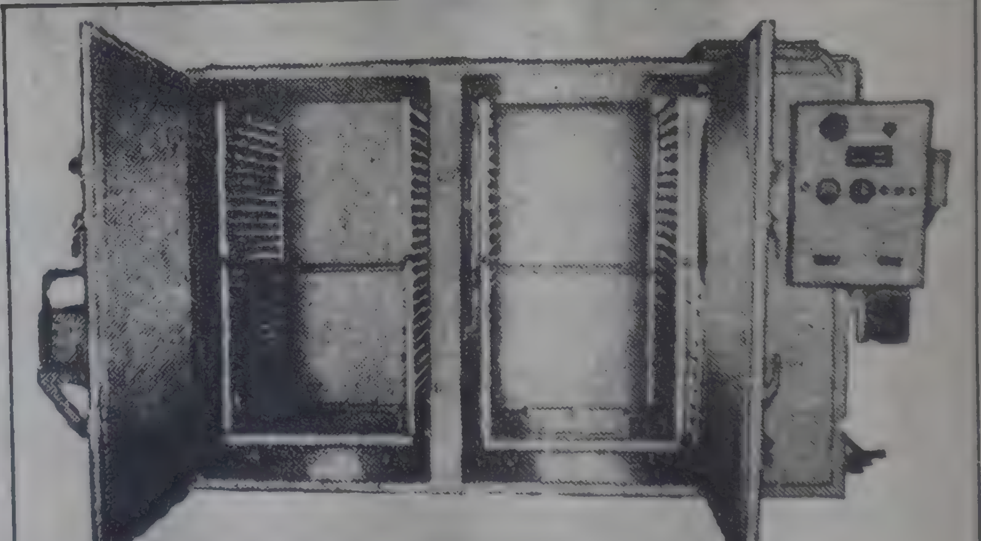

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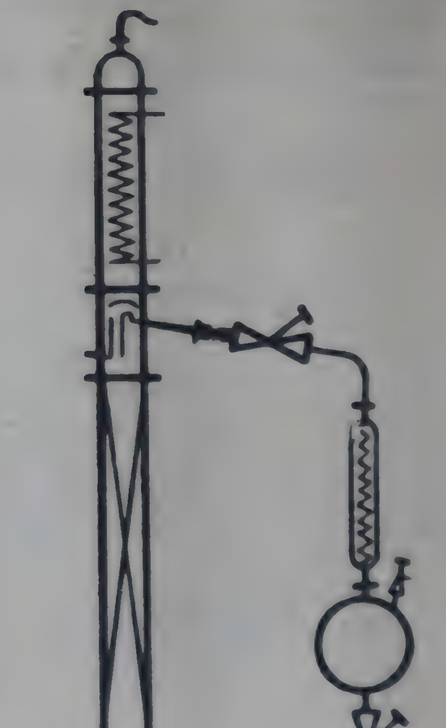

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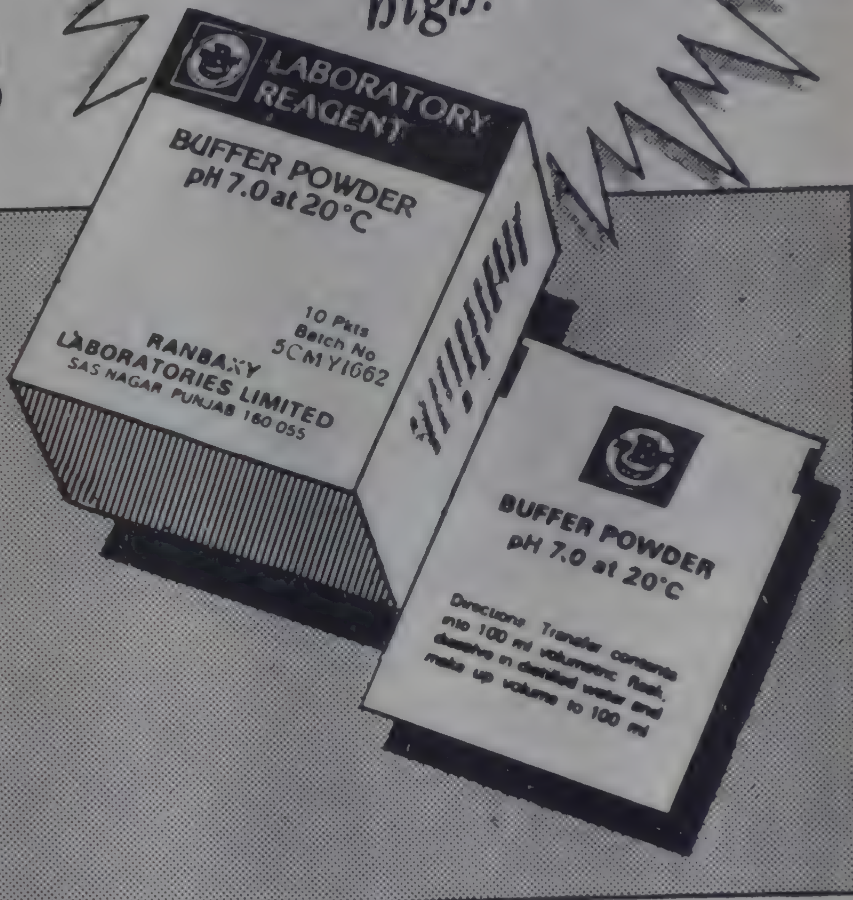
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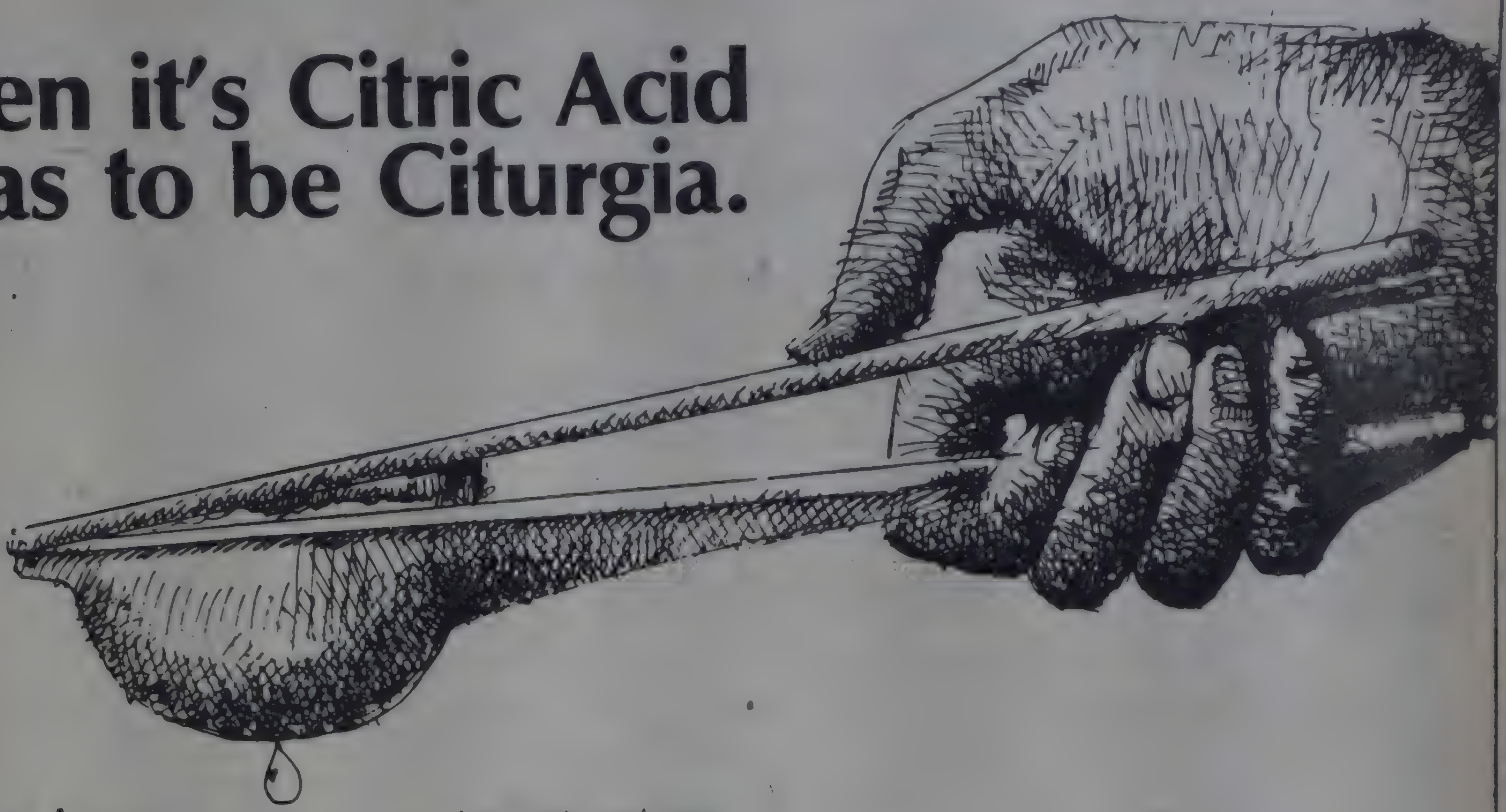

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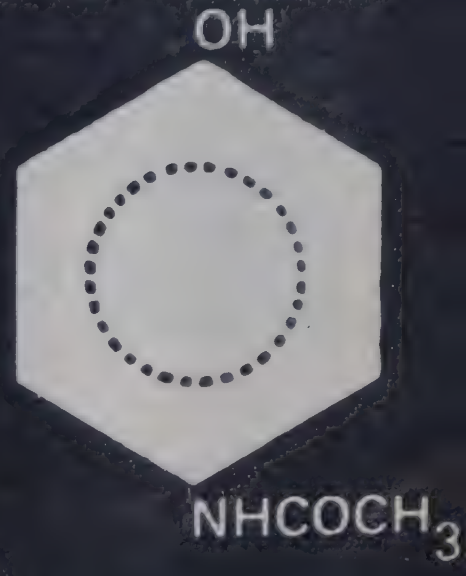

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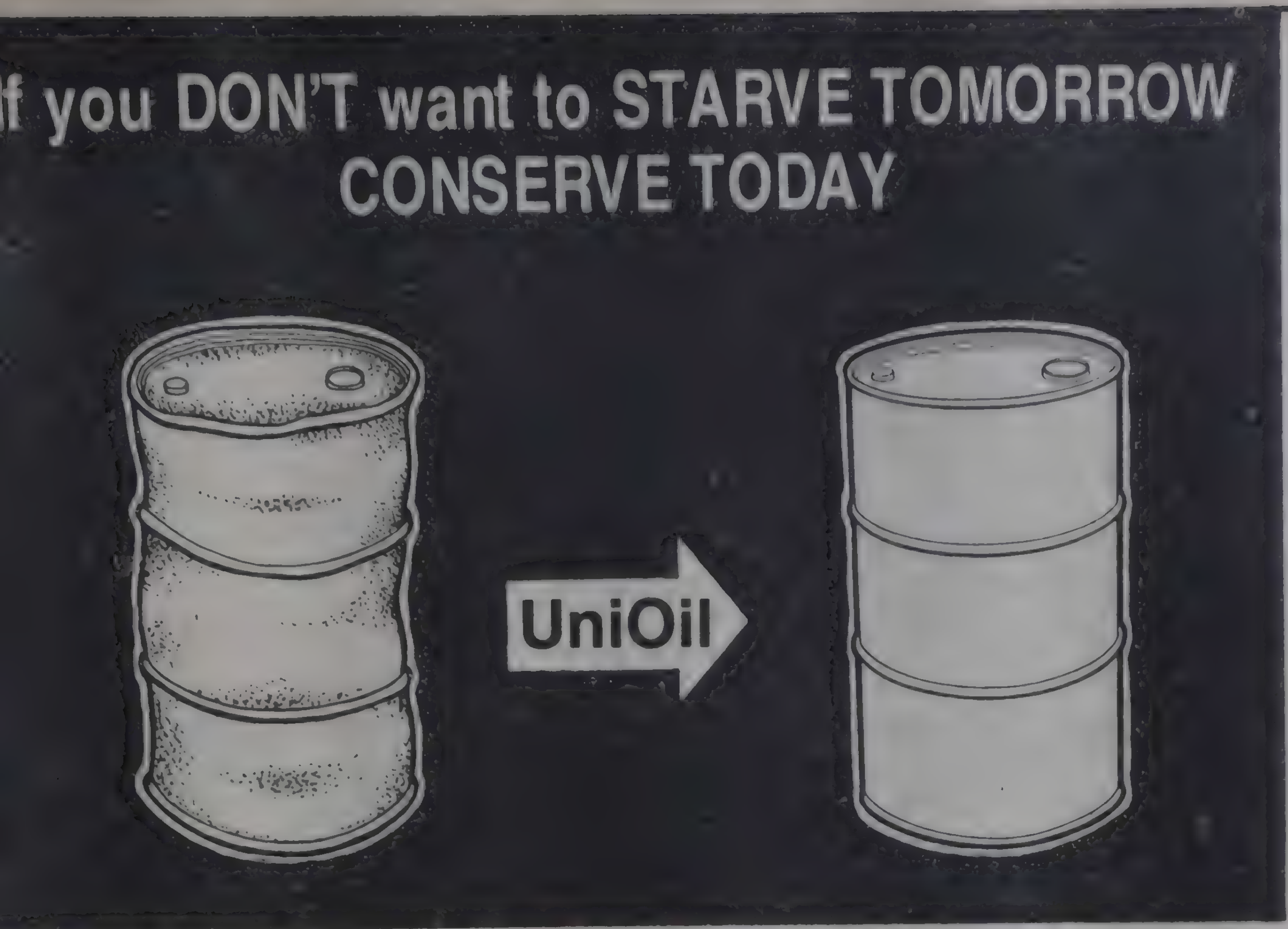
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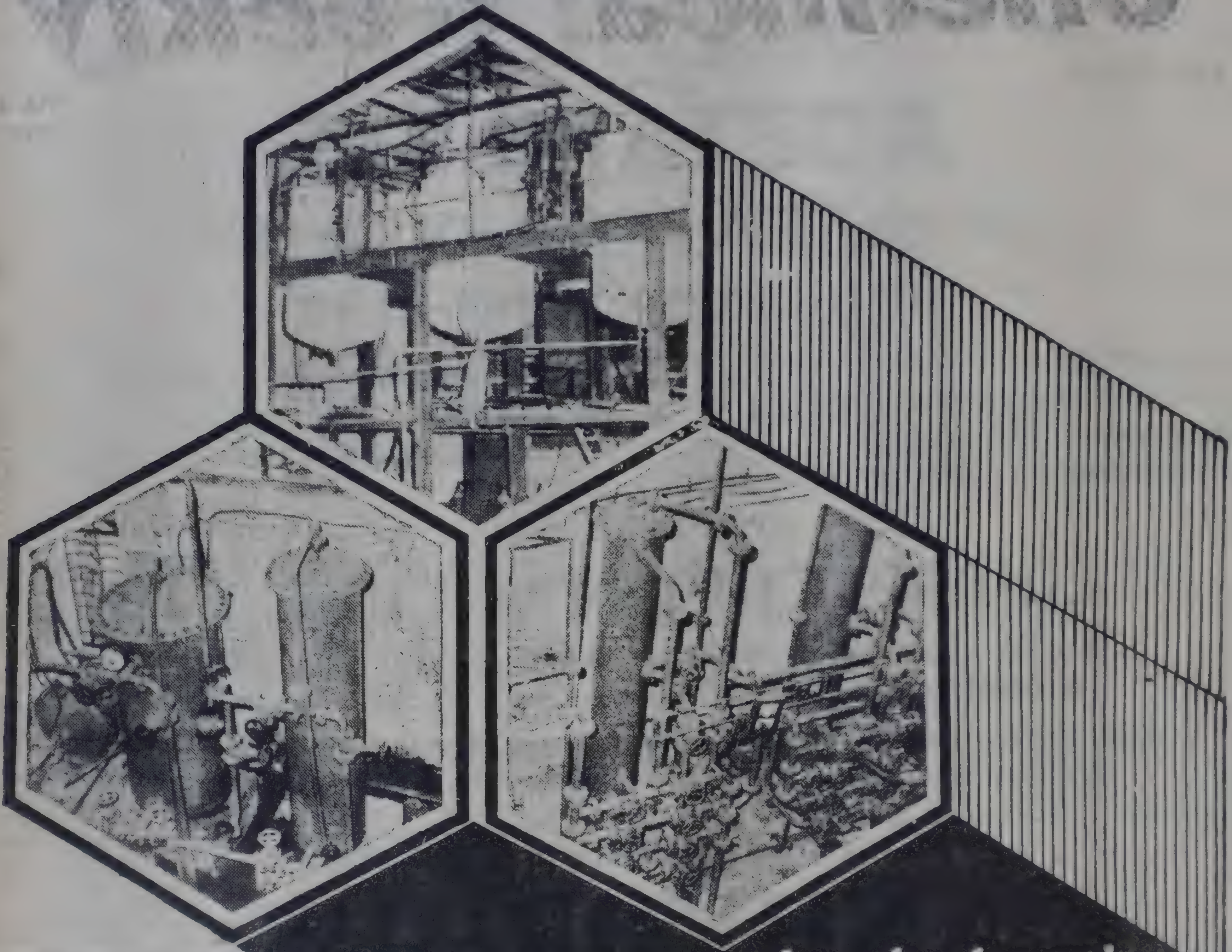

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Publishers:
SEVAK PUBLICATIONS

Editor - Publisher
R. RAGHAVAN

Advertisement Manager
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Administration/Circulation
VIJAY RAGHAVAN

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306, Shri Hanuman Industrial Estate
G.D. Ambekar Road, Wadala,
BOMBAY 400 031.
Phones: 4120743/4131198.
Telex: 011-76053 CWLY IN

Madras Office:
Room No. 9, Wellingdon Estate,
3rd Floor, 24, Commander-in-Chief
Road, Madras 600 105.
Phone: C/o. 471659.
Telex: 041-6290 CWLY IN.

Printed at:
Sevak Publications,
25, North Mada St., Thiruvanmiyur,
Madras 600 041.

Fast Print Service,
307/308, Shri Hanuman Indl. Estate,
G.D. Ambekar Road, Wadala,
Bombay 400 031.

Subscription Rates:
(Inclusive of Postage)
India: Rs. 400.00
Foreign: US$ 175.00 (Air Mail)
US$ 75.00 (Sea Mail)

Subscription charges payable in advance in favour of SEVAK PUBLICATIONS

CONTENTS

Heralding the 21st Century: Pipeline Transport of Coal — T.P.S. RAJAN 41
Chemarena — S.L. VENKITESWARAN 43

IN THE NEWS

UB Petro commences commercial production 46
Oswal Petro expects Rs. 120 cr. turnover from Chembur Plant 48
DGTD meet to reivew DMT/TPA supply 48
Bombay Dyeing hikes DMT prices by Rs. 3,000 49
Shortage of naphtha may force PSF units to close 49
Petroleum prices not to be increased 52
Reliance hikes PTA price 52
HDPE, MEG & LAB projects: Rs. 27 Cr. bank guarantee sought from RIL, RPL 58
Shri M.S. Gurupadaswamy to inaugurate ICMA AGM 59
Industry-research units interaction vital 63
NOCIL's Thane plant shut down 66

PHARMACEUTICAL CAPSULE

ICMR awards for 20 scientists 49
Many combinations under DPCO 53
Hoechst moves court against Govt. claims 54
Bengal drug makers for 'single windows' 59

FERTILISER NEWS

Setting up of ammonia plant: Deepak Fertilisers' application rejected 50
SPIC to modernise fertiliser plant 59
Babrala Fertiliser Project: Tatas offer to refund money 62

OIL & NATURAL GAS SCENARIO

ONGC slashes crude production 64
ONGC flayed for exchange drain 64
Gujarat backs Rs. 1,900 crore export oriented oil refinery proposal 65
Crude oil price up 50% in a month 65
Oil price rise may hit poor nations 67
Proposal to raise refining capacity 68
Pleas to reconsider petrol use curbs 69
Essar refinery proposal may stall Reliance plan 69

ENVIRONMENT NEWS

Draft paper on pollution: stiff penalties proposed 70
World Bank help in effluent treatment 71
APPOINTMENTS 73

ON THE ECONOMIC FRONT

Industrial production in 1990-91: 10% growth forecast 76
COMPANY NOTES 78

SPECIAL ARTICLES

Sickness in Small and Medium scale Chemical Industries — N.S.V. 109
Assessment of the Inter-Relationships Between the Various Specifications of LAS R. RAMU, C. RAMANATHAN & S. MAHESHKUMAR 113
Application of Sodium Chlorate for the Pulp and Paper Industry — RAJIV PAREKH 119

REGULAR FEATURES

Spotlight on Biotechnology & Life Sciences 91
Science Briefs 97
Materials Management — N.R. PAI 105

INTERNATIONAL SPECTRUM

Chemical News from Abroad 121
Biotechnology 124
Environment 127
News About New Projects 129

MARKET INFORMATION

Bombay Chemicals Market 133
Bombay Dyes Market 138
Delhi Market 140
Madras Market 141
Calcutta Market 141
Shipping News 142
Materials Imported/Exported 145

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HERALDING THE 21st CENTURY - 67

Pipeline Transport of Coal

For many years past, the coal industry has seen freight costs rising sharply. The effect of such steeply-rising costs on basic industry is both serious and widespread, and is flected in higher production costs. The first commercial coal peline was built in London in 1914, an 8 in. diameter cast-on line being used to deliver lump coal from Thames barges the stockpile of a power station some 1,750 ft. away. The hief objection to coal pipelines until 1945 was economic, nce it was generally cheaper, or as cheap, to move coal by ail, road or water, and the capital cost of a pipeline would ave been totally unjustified.

The widely-publicised Ohio coal pipeline, completed in 957, is said to have cut freight costs of coal from the pit-ead at Cadiz, Ohio, to the Eastlake works of the Cleveland Electric Illuminating Company, some 108 miles away, by up o 50 per cent. The Ohio coal pipeline is the biggest instal-ation of its type in the world, and was completed in 1957 by the Pittsburg Consolidated Coal Company in an effort to overcome the swiftly rising cost of rail transport.

The 10 in. diameter steel pipeline delivers some 3,200 tons per 24-hour day of minus 1.17 mm. diameter coal as a 42 per cent solids content water slurry, the process water being treated with an inhibitor to minimise internal corrosion of the pipeline. The wall thickness of the line, which was constructed in accordance with the ASA Code for Pressure Piping (ASA B31), is 0.375 in. except at obvious points where frictional thinning is likely to occur, when it is increased to 0.5 in. These thicknesses are well in excess of the minimum required for the stated maximum operating pressure of 600 lb. per sq. in., the extra metal being allowed solely to compensate for the expected heavy wear due to frictional thinning. The estimated life of the pipeline is 15 years.

The line is protected against external corrosion by a single coat and wrap of coal tar primer and enamel, fibreglass reinforcement and kraft paper outer wrap, and is buried to 4 ft. cover to avoid possible frost damage during freezing weather conditions. Three pumping stations are installed, one of the inlet, one at mile 30 and the other at mile 60. Each station comprises two operating and one standby electrically-driven, reciprocating mud slush pumps, and in the case of electrical failure at either of the two downstream stations, the next station upstream is capable of handling the extra load temporarily. Apart from the pumps and the pipeline loading valves, all coal-handling equipment used in the system is standard machinery already used widely in the coal industry.

The average velocity of the slurry through the line is 4.5 to 5 ft. per second, and the transit time of slurry through the system is to the order of 30 hours. On arrival at the terminal, the slurry is discharged into a settling tank in which the coal particles settle out by gravity and are pumped to disc filters for rough drying before being thermally dried to a specified minimum water content and stockpiled for use in the power-station boilers. The process water from the settling tank is flocculated until the estimated solids content does not exceed 10 parts per million, and is then discharged into the mains water outlet of the power station. This open cycle principle, in which the process water is discharged and not returned to the inlet of the pipeline for further use, is the only economical design for a long-distance coal pipeline in an area where water is cheap and plentiful. The closed cycle principle, on the other hand, has certain technical advantages and is of value in short lines, such as for raising coal from the pit bottom to the pithead.

Pipelines in Europe: The French coal pipeline, an 15 in diameter steel line some 5.7 miles in length, was completed in 1947 to carry crushed and screened coal direct from the pithead to a power station. The throughput is almost 6,000 tons a day of minus 2.5 mm. diameter coal, slurried with water to a maximum of 15 per cent solid concentration. This line also operates on the open cycle principle.

The Russian pipeline, built in 1957 to carry crushed and screened coal of minus 0.794 mm. diameter from a central collecting point in a mining district to a power station, is a 12 in. diameter steel pipeline some 38 miles in length. The throughput is in the order of 4,800 tons a day of coal as a water slurry of up to 38 per cent solids content, with a velocity of 4.8 to 5 feet per second. This line is also of the open cycle type. A major pipeline, Block Mesa, was set up in 197 to provide 4.8 mt coal a year from a coal mine in Arizona to a power plant in Nevada. This pipeline has established an outstanding reliability record of better than 99%. Slurry pipelines are operating successfully to carry coal and other minerals in Florida, Utah, California, Arizona and Georgia and elsewhere outside US. Typical of the latter is a 67 km iron ore concentrate slurry pipeline between Kudremukh and Mangalore in India, using digital computer control operation, perhaps the first one of its type in the world.

A $2 or 3 billion slurry pipeline can save, an average, $1 billion per year in transportation cost. Besides the reliability is much better. The transport cost of a slurry pipeline is much lower (20%) compared to that for rail (60%). As the coal production in India is concentrated in the eastern and south eastern states coal movement over long distances of 1000-1500 Km. is inevitable. And the freight rate often exceeds the pit head price of coal.

When and where will be India's first coal slurry pipeline? Best prospects appear to be from Singrauli mines (M.P.); to Wankobari power plant (Gujarat)—1220 KM; to Vapi (proposed 2000 MW Station)—1000 KM; or to Ropar via Badarpur, Panipat & Bhatinda. Feasibility studies are being carried out and offers for supply of technology have been received from Canada, France and U.S.

Gujarat's coal problems: Coal supplies have been the bug bear of Gujarat's industry and Power Plants. As it is, the fuel cost of industries in Gujarat, the Gujarat Chamber of Commerce has pointed out, is 40 per cent higher than the all-India average. Successive increases have pushed the price of coal to Rs. 850 a tonne in 1989 from Rs. 287 in 1981, a 195 per cent increase in eight years. How totally dependent Gujarat is on coal for power may be seen from the fact that 90 per cent of power in the state is being generated in coal-based thermal plants. And yet coal linkage for thermal stations leaves much to be desired. At the best of times coal transport to Gujarat is irregular. Since the railway capacity is almost saturated Gujarat has made do with uncertain supplies.

The Planning Commission had rejected the Gujarat Government's proposal to lay a coal slurry pipeline from Singrauli to three power stations in Gujarat, at Wankbori, Ukai and Gandhinagar. But the commission was of the view that such pipelines could be considered in the future for large-scale power projects that involve huge quantities of coal over long distances.

The Gujarat Government had argued that a coal slurry pipeline was an attractive alternative to coal movement by rail, and further that moving coal by pipeline to power stations near the electricity consuming centres was cheaper than setting up super-thermal power stations at the pitheads.

The Planning Commission has accepted most of these arguments, but rejected the immediate proposal because the coal from this field has already been booked for other uses. This puts a spanner in the works of some international companies which specialise in laying slurry pipelines. India does not have the technical expertise to do the job on its own a would inevitably have had to go in for foreign collaboratic Realising this, some foreign companies had been lobbyi for the pipeline project from Singrauli to Gujarat.

The Commission, however, has noted that in a number Western countries, particularly the United States, pipelin are increasingly replacing the railways when it comes transporting vast quantities of oil and coal. Accepting the co logic involved in this shift, it feels that the country could g in for its first coal slurry pipeline project towards the begi ning of the Eighth Five Year Plan in 1990. This will be f major power projects in the west and north-west that involv moving 10 million tonnes of coal and more annually.

Another argument in favour of the pipelines is that give the geographical pattern of power consumption there is a lim to the number of super-thermal power stations that can b set up at the coal pitheads. For this reason power load cer tres will have to be dotted across the country. This woul eventually make coal pipelines an inescapable option.

The First Project in India: Approval has been given fo the preparation of a detailed project report at a cost of R 93 lakhs for the setting up of a Demonstration Coal Slurr pipeline from New Majri Colliery of WCL and Chandrapu thermal power station of MSEB covering a distance of 4 km with an annual capacity of 800,000 tonnes with Engine ers India.

Conclusions: Summarising, it may be fairly said that pip elines offer a promise of cheaper bulk transportation of coa than do existing methods, but only for small diameter industrial grades, and certainly not for lump coal at the presen time, although this may come in the light of further development. The two essentials for an economic coal pipeline would be high load factor and the development of a simple cheap method of dewatering the coal after transmission.

It is unlikely that coal pipelines will become commonplace for a number of years, however, for several reasons. Firstly, the economics must be proved beyond all doubt by large scale demonstration models, followed by more ambitious operating systems. Secondly, although it may be said that such pipelines would clear a great deal of rail and road traffic from the already overburdened transport system, such an advantage would be more apparent than real for a long time, and at no time would pipelines be able to clear traffic from urban areas, as distinct from trunk roads. Lastly, the amount of coal transported even by a network of such pipelines would be only a small percentage of the total coal mined, due to the selective diameters of coal which can be transported most economically and due to the very wide distribution of industrial coal users throughout the country, not all of whom could be supplied in this way. Consequently, unless the actual consumers of the piped coal were given the financial benefit, to the exclusion of all other consumers, which is most unlikely, the overall effect on the total transport charges of the industry would be small. **— T.P.S. RAJAN**

CHEMARENA

.L. VENKITESWARAN

Butadiene

Butadiene is the olefine (diolefine) which has had uncer- in progress over the years and it was always sold at prices wer than for the C_2/C_3 olefines. Although it has a wide nge of uses, the bulk of these relate to synthetic rubber. e small and medium cars, radial tyres and the much tougher res have left the offtake of synthetic rubber static in USA r some years. Europe depends on naphtha cracking plants meet the butadiene demands and has had some quantity r exports but the position may come under strain in the oming years.

The use pattern in USA is estimated as under for 1989:

SBR	...	35%
PBR	...	23%
Nitrile rubber	...	3%
ABS	...	6%
Polychloroprene	...	6%
SBR & other lattices	...	11%
HMDA	...	12%
Others	...	4%

Out of total 1.6 million tonnes.

US production of tyres had been on decline and imports of cars with original equipment (of tyres) have cut into the demand. International Institute of Synthetic Rubber Producers (IISRP) forecast that US-Canada demand will grow at 0.7% in 1990 and prices prevail at 27 to 29 cents/lb. Co-product from naphtha crackers provided 68% of supplies in 1988 and two more naphtha crackers may go into production by 1992. Canada is a supplier and US imports about 25% of its requirements.

The major chemical use of butadiene is for hexamethylene diamine (HMDA) the intermediate for nylon 66 for which the demand is static. The possibility of shift to other feedstock for HMDA are always under study but not yet ready for commercial operation.

India has abandoned butadiene production from ethyl alcohol and is now dependent on imports to supplement the supplies from naphtha cracking. This situation will continue and get buffeted by the dislocation of oil supplies in the wake of the Middle East crisis.

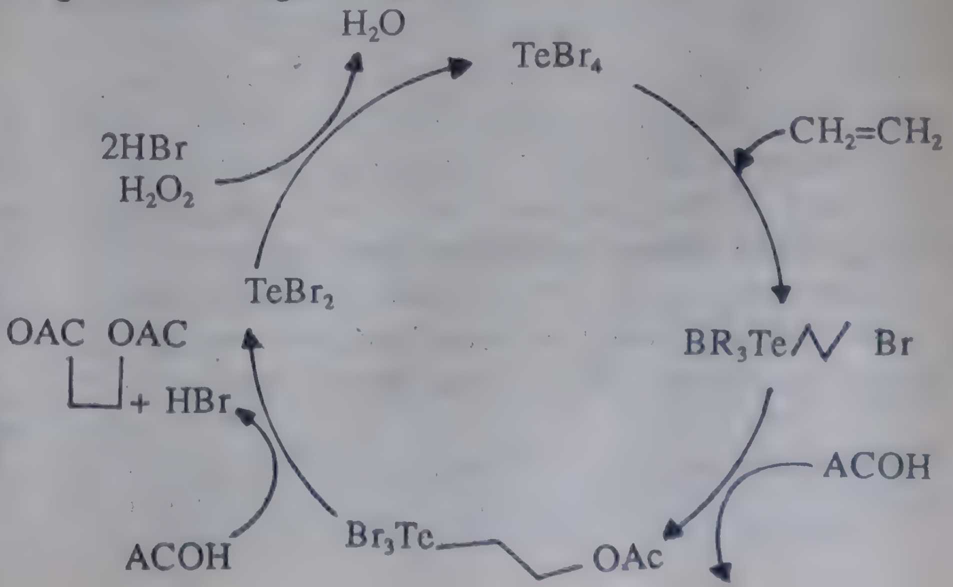
Ethylene Glycol directly from ethanol or ethylene?

Activated carbon-hydrogen bond such as in methyl radcal has been attracting much attention of late -- mainly conersion of methane to more useful chemicals. Carbonylation f methanol is a very successful commercial process. But can e CH_3 in ethyl alcohol lead to ethylene glycol by hydroxlation? Chemists at the California Instiute of Technology, asadena, report that a mixture of platinum salts is able to this hydroxylation with enough selectivity --JACS-112-528 (1990). Heating ethanol in an aqueous mixture of Pt(II) nd Pt(IV) salts resulted in glycol and several other products acetic acid, glycolic acid in low yields. The attack on CH_2OH group also occurs and perhaps a lot more work is equired before a practical process for MEG can result. Today is only a distinct and distant possibility and as a country ith a lot of interest in ethanol we should set in motion some esearch on these lines.

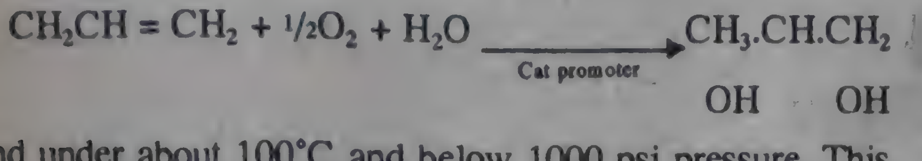
But there is another approach for ethylene to MEG reported y Halcon using a homogenous catalyst based on tellurium nd hydrogen bromide to get the mono and diacetals of MEG. hese are hydrolysed to the glycol and acetic acid is recyled. The reaction is said to be as under:

$$CH_2 = CH_2 + 2ACOH + {}^1/{}_2O_2 \longrightarrow ACO\text{-}CH_2.CH_2.OAc + H_2$$

The selectivity is said to be near 95% but rate and concentrations and catalyst used are not known. The reaction is assumed to be similar to that of acetaldehyde from ethylene by the Hoechst/Wacker process. The proposed mechanism is given in the figure below.



Another process for propylene oxidation using Osmium tetroxide as catalyst with a promoter such as cupric chloride or bromide is reported by chemists at Exxon Chemical. Osmium is used as the tetroxide or halide and the reaction is as under:



$$CH_2CH = CH_2 + {}^1/_2O_2 + H_2O \xrightarrow[\text{Cat promoter}]{} CH_3.\underset{OH}{CH}.\underset{OH}{CH_2}$$

and under about 100°C and below 1000 psi pressure. This is a direct oxidation of propylene to the glycol and not indirect through a peroxide but there is no claim on reaction ethylene. Polar organic solvents miscible with water are us It is still too early to expect commercial use of such a rea tion for propylene glycol, let alone of ethylene glycol. T catalyst is costly and its recovery would be critical.

The more practical way to MEG from ethylene direct is the use of peracetic acid for the reaction and get copr duct acetic acid along with glycol. Such a process for pr pylene oxidation is alredy commercial.

Greenhouse Economies

Environments and hazards are the in-theme for today so much so that the prestigious *"Economist"* of London devotes a lengthy article to the subject of "Greenhouse Economies". The subject is global warming and the so-called greenhouse gases which contribute to this great risk and there is need for careful cost benefit analysis instead of panicky overreaction to the consequences of fossil energy use and its impact. Scientific monitoring has firmly established two things -- the increasing levels of CO_2 in the atmosphere due to the burning of fossil fuels and consequent warming of the atmosphere. The second thing is ozone depletion in the ice-bound expanse of the Antarctic. Other gaseous emissions like CFC's, methane also add their mite to the greenhouses gases -- a term which means a warm-up of the atmosphere. There is a lot of thinking and,analysis of the rainfall levels, water levels and flows, extremes of droughts, climate changes but such data is not considered adequate for forecasts of the future levels of CO_2 rise and temperature rises. Climate change is said to be *terra-infirma* and social and economic impacts of climate change not reliable enough. There are too many uncertainties to enable firm conclusions but the majority view is that the projected risks even if questionable to some extent are far too disastrous not to heed the warnings even at this stage.

It is projected that climate has little economic impact upon advanced industrial societies. Only 3% of American GNP originates in climate sensitive factors such as farming and forestry. Another 10% comes from sectors only moderately sensitive -- energy, water systems, property and construction. Farmers have the ability to adapt to changes in environmental conditions and while yields of many crops may be reduced the higher CO_2 level will have benefits too. Manufacturing, mining, utilities, finance, trade and most services are not likely to be affected by the greenhouse gases. But the studies indicate an acceleration in sea level of one foot over the next century -- not a proposition to be alarmed about.

Developing countries are far more vulnerable with about a third of GNP originating from agriculture and much vu nerable to climate change. But developed countries are mostl safe from such changes. Prognostication of disaster are sub ject to much uncertainties and could be dead wrong on th effects of global warming. But even so steps to counter CO build-up are called for even if the effects may be a centur ahead. Reducing and phasing out CFC's is an agreed pro gramme. Reduction in use of fossil fuels or of extensiv reforestation is part of present day thinking. Energy studie indicate that a 10% reduction of CO_2 emissions can b attained at modest costs and even 20% over a longer period But this is not merely postponing the day of disaster. 60% of reduction in CO_2 emissions is estimated to cost ove $300 billion per year. Trade-off between economic growth and slow down in emissions is necessary and the article suggests an international "carbon tax" to be introduced gradually. But the special case of developing countries receives little thought though activity by them will have global impact Is there a possibility of extensive growth of carbon eating organisms to counter CO_2 build up?

Climate systems are extremely complicated and not easy to visualise over the centuries. Ice cap melting and rise in sea level is too uncertain to be taken as a portent to diasater. There is recognition that global warming is a reality and a global issue calling for international cooperation. Affluent nations may need to expand the concept of foreign aid to include subsidising environental improvement by poor nations. There is need for more intensive study and analysis of the economic and social impacts of future climate change. Replacing fossil fuel gradually and resort to nuclear power are inevitable. The concept of taxes on carbon say $ 5 to 10 per tonne of CO_2 equivalent needs detailed analysis though there may be few takers of this as an alternative to regulatory intervention.

For India there is need to take a look at global issues of climate disruption and move away from the present day preoccupations with castes and reservations.

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UB Petro commences commercial production

UB Petroproducts Ltd. (UBPP) a joint venture of the UB group and the Tamil Nadu Industrial Development Corporation, has commenced commercial supplies of its products viz. propylene glycol, polyols and propylene oxide. Trial production had commenced from August 1, and about 200 MT had already been sold in the first month. The plant was formally inaugurated by the Tamil Nadu Chief Minister Shri. M. Karunanidhi on August 12. With commencement of supplies UB Petroproducts becomes the first company to commence commercial production of these import substitute chemicals. Manali Petrochemicals Ltd., has also commenced supplies of glycols. Its' polyol project however has been slightly delayed due to late arrivals of some machinery and trial production is expected to commence by October.

Commencement in record time

UBPP has built the plant in a record time of 16 months after site mobilisation, in technical collaboration with Pressindustria AG, Switzerland and Montedipe Srl, Italy. The company has tied up with Madras Refineries Ltd. (MRL) for supply of propylene feedstock and with other companies for raw materials such as limestone, lime, chlorine etc.The company has already created sufficient awareness of the versatility of Polyol applications. A seeding programme for propylene glycol has been successfully implemented using material from the foreign collaborators. The experience gained in this programme is expected to pay rich dividends in the marketing of indigenous materials. The company has also financed a widespread distribution network for its products. Regionwise distributors are as follows: **New Delhi** — Paras Dyes & Chemicals, Kapoor Chemical Corporation; **Ahmedabad** — Tradex Corporation; **Bombay** — Eastern Organics, Ramniklal S. Gosalia, Krupa Trading; **Madras** — Muthu Meena Agencies, Reichhold Chemicals India Ltd; **Bangalore** — Somu & Co; **Calcutta** —Asian Distribution Trade Corporation.

Licenced and installed capacity (MT) are as under:

	Licenced capacity	Installed Capacity
Polyether polyols	12,000	8,000
Propylene glycols	12,000	7,000
Propylene oxide	12,000	12,000

Propylene Glycol uses

UBPP propylene glycol is a high quality and high purity product meeting the standards of a USP grade material. The company has taken necessary steps for the approval of Indian Pharmacoepia. Major applications of the chemical are as under.

In Pharmaceutical Industry

As a carrier, solvent, emollient and humectant, propylene glycol is used in many preparations including estrogen and vitamin formulations, antiseptics salves, elixirs and ointments.

In Food Industry

Propylene glycol USP/IP is used as a solvent for extraction of vanilla flavour from vanilla beans, coffee flavour from roasted coffee, and such other flavours.

As a solvent for food colours it has the advantages of lower volatility and lower cost.

Food antioxidants such as Butylated hydroxy anisols (BHA) and butylated hydroxy toluene (BHT) are sold dissolved in propylene glycol.

As a solvent for inks used in fo packaging.

As a humectant it is used to increa the shelf-life of baked goods.

As a plasticizer for cork.

As heat transfer medium in the coo ing of beer, wine, milk and other liquid and in the immersion freezing of pou try and other foods.

In Tobacco Industry

Propylene glycol, USP/IP, is utilise in the tobacco industry for its prope ties as a humectant, plasticiser and so vent. Its main use is in cigarett manufacture but it is also employed t plasticize cigar wraps and in pip tobacco, chewing tabacco and snuf After the tobacco has been aged a desired, the leaves are stripped from th stems and shredded to the desired size To prevent breaking and crumblin during this and following operations, th leaves are sprayed with a 'casing' mixture, composed mainly of propylen glycol, USP/IP, sugar and water, befor stripping from the stems. Generall speaking, less than 5% glycol i required to maintin the desired moistur content in the tobacco over a wide rang of relative humidities. The glycol als helps in providing a ''fresh' quality product.

Besides being an excellent humectant and plasticizer, propylene glycol, USP/IP has all the requirements of a solvent for the various flavouring materials used in the tobacco industry. In addition the glycol helps to retain the flavour of the tobacco.

In Cosmetic Industry

In vanishing creams, propylene glycol aids in the formation of a smooth product. Soap products, and shampoos can also use propylene glycol.

DIPROPYLENE GLYCOL

UBPP dipropylene glycol can be used as:

Chain extender in the manufacture

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of polyether and polyester that are used in producing polyurethane foams.

Sovent for resins, nitrocellulose and many organic compounds.

Hydraulic fluid in brakes and shock absorbing fluid.

Textile lubricants and as water miscible solvent in printing ink formulations.

Sovent in extraction processes for separating aromatics from other hydrocarbons.

Raw materials for the manufacture of esters and other chemical intermediates.

UBPP plans for immediate future:

*Production of 14 different grades of polyols required for the manufacture of polyurethane flexible slab stock foam, rigid polyuethane foams for insulation, packing application, wood substitute articles, polyurethane elastomer applications and polyurethane semi-rigid foams for the manufacture of automobile components, furniture etc.

*Company is pursuing with the Government of India for bringing MDI/TDI (Toluene Di-isocyanate), which is the other important raw material for flexible foam manufacture, under "stock and sale" category of imports for ease of availability to foamers, who are in the small scale industry sector.

*Provide sufficient quantity of propylene oxide to Indian market, thus removing the hurdles of import of this precious raw material, giving a boost to the manufacturer of:

1. Propylene oxide condensates, emulsifiers, de-emulsifer, softner, corrosion inhibitor.
2. Ethyoxylated condensate propoxylates.
3. Aquapolymer hydroxyethyl guar.
4. Hydroxy propyl guar.
5. Ethylene oxide-propylene oxide-copolymers.
6. Propylenated products.
7. Oil field chemicals.
8. Amides and derivatives.
9. Defence application.

The company is actively considering the possibilities in exports. A small trial order to a neighbouring country has already been acheived, and the company is optimistic of its changes.

The ready availability of these import substitution chemicals in quantities that meet the all India demand, will enable the Government of India to save nearly Rs. 50 crores per annum in Foreign Exchange.

OSWAL PETRO EXPECTS RS.120 Cr. TURNOVER FROM CHEMBUR PLANT

Oswal Petrochemicals expects a turnover of Rs. 120 crore from its Chembur plant in 1990-91 by upping the production of Low Density Polyethylene (LDPE) and other olefins.

This was stated by Mr. Abhay Oswal, chairman, Oswal Petrochemicals in the course of the plant visit to Chembur at Bombay on Sept. 9th. Mr. Owsal said that though there had been no expansion, the modernisation had cost the company Rs. 40 crores. The entire modernisation was according to standards set by Engineers India Limited (EIL), he said.

The result of the modernisation was that in the field of power generation the company would save about Rs. 10 crores. The company's power demand at Chembur plant was to the tune of 10.5 mega watts. At present they were paying Rs. 1 crore per month as power bill, he said. He was hoping to increase the percentage of ethylene produced from 26 per cent to 32 per cent by further fine turning in some other areas he said.

The second aspect of the plant was that it had been geared up to be environmentally conscious. Tree plantations, regular atmosphere checks, blast, walls, water curtains, installation of hold up pits, and instruments and equipments f better operations of effluent treatme plant were considered.

Mr. Oswal further said that the pla had started functioning after four yea It had been closed down by its earli owners Union Carbide Chemicals a the Oswals had bought it in Augu 1989.

The Oswal Agro Mills was going commission a sugar mill at Moradaba UP, on October 30, 1991 at the begi ning of the sugar crushing season. In tially 3,000 tonnes would be crushed, said.

He felt that his power generation pr gramme in Shahjahanpur would yie good results. The 260 megawatt pla costing Rs. 250 crores would suppl electricity to the UP government at th cost of 95 paise per unit while it woul cost 55 paise per unit to produce ele tricity, he said.

In case of the Shahjahanpur fertilise plant Mr. Oswal felt there would be delay of about six months. Though th civil works have been completed, an the machinery identified, the compan was awaiting certain government clea rances.

DGTD MEET TO REVIEW DMT PTA SUPPLY

DGTD has decided to convene a urgent meeting on September 21 t review supply of position of DMT/PT in view of the recent cut in naphth supply. The meeting to be held in Ne Delhi will be attended by representa tives of polyester fibre and filament yar manufacturers and producers o DMT/PTA. The government had earli reviewed the supply and demand pos tion for DMT/PTA, basic raw materi als for the polyester industry Considering the likely shortfall i supply, the authorities had decided t permit import of these materials agains additional licences.

ICMR awards for 20 scientists

Twenty scientists were presented the ndian Council of Medical Research ICMR) awards for excellence in varous fields of medicine. Presenting the wards, the Minister of State for Health nd Family Welfare, Mr. Rashid Masood Sahib, said technology had to be adapted to suit the socio-cultural and economic conditions of our people. There is also a need to improve the outreach of health services so that the under-privileged sections of society can benefit by them, he said. The scientists who were presented the awards were:

Dr. S.S. Guraya, Punjab Agricultural University, Ludhiana, Dr. M. Krishnan Nair, Regional Cancer Centre, Trivandrum, Dr. Usha Gupta, All India Institute of Medicial Sciences, New Delhi, Dr. Indu Gupta, PGIMER, Chandigarh, Dr. J.S. Mathur, Lirm Medical College, Meerut, Dr. K. Krishnamachari, Regional Medical Research Centre, Jodhpur, Dr. U. Sengupta, Central Jalma Institute for Leprosy, Agra, Dr. S.P. Thyagarajan, A.L. Mudaliar PG Institute of Basic Medical Sciences, Madras, Dr. Urmila Pingle, National Institute of Nutrition, Hyderabad.

Dr. Sumitra Dass, PGIMER, Chandigarh, Dr. T.N. Raghava Varman Thamapan, Central University, Hyderabad, Dr. V.P. Sharma, Malaria Research Centre, Delhi, Dr. P.N. Kulhara, PGIMER, Chardigarh, Dr. Dinesh K. Bhargava, AIIMS, New Delhi, Dr. Santosh K. Bhargava, Paediatrician, New Delhi, Dr. B. Ravindran, Regional Medical Research Centre, Bhubaneswar, Dr. G.P. Pal, Government Medical College, Surat, Dr. Kiran Katoch, Central Jalma Institute for Leprosy, Agra, Dr. S.K. Jindal, PGIMER, Chandigarh, and Dr. H.P.S. Sachdev, Maulana Azad Medical College, New Delhi.

BOMBAY DYEING HIKES DMT PRICE BY Rs. 3,000

The Bombay Dyeing has decided to hike the price of DMT from Rs. 24,000 a tonne to Rs. 28,000 with effect from Sep. 10th. The company has also decided to offer a discount of Rs. 1,000 per tonne at present so that the effective increase in price works out to Rs. 3,000 a tonne.

The company is the largest producer of DMT in the country followed by IPCL and BRPL. Both the other DMT producers are soon expected to follow.

Reliance Industries is the lone producer of PTA in the country and it is also likely to raise the selling price, according to industry souces at Bombay. DMT and PTA are alternative basic raw materials for polyester fibre, yarn and film manufacturers. The industry sources were expecting a hike in the price of DMT by Bombay Dyeing any time in view of the recent spurt in the price of paraxylene from $ 500 to 600-625 per tonne in the international markets.

(For earlier news see page 56)

SHORTAGE OF NAPHTHA MAY FORCE PSF UNITS TO CLOSE

The Association of Polyester Staple Fibre Manufacturers has urged the government to restore full availability o naphtha and paraxylene as the DMT and PTA producers have informed all PSF manufacturers of possible cuts in supplies. In a press release issued a Bombay the association said if the government does not restore full supplies of naphtha, PSF units would have to shut down, leading to a virtual shortage of cloth during the coming festive season. The association has also refuted charges that its PSF members have increased their product prices by stating that the price being charged by the manufacturers to their consumers are well within the BICP guidelines and well below what is considered 'remunerative'.

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SETTING UP OF AMMONIA PLANT

Deepak Fertilisers' application rejected

The Union government has turned down Deepak Fertilisers and Petrochemicals Corporation Ltd.'s application for setting up a Rs. 125-crore 300 tonne per day ammonia plant, without giving any reason. The rejection comes at a time when Minerals and Metals Trading Corporation (MMTC), the canalising agency for ammonia inports, has cautioned fertiliser units that it cannot assure future supplies in view of the Gulf crisis. The fertiliser industry imports more than one million tonnes of ammonia a year at approximately US dollar 175 a tonne.

The ammonia market showed an uptrend since March, boosted by a four lakh tonne purchase by India, the main buyer of Gulf ammonia. The ban on Kuwait product is bound to push up prices further. Other regualr buyers of Kuwaiti ammonia like South Korea are likely to turn to Saudi Arabia, UAE, Bahrain and Qatar. The UN embargo came at a time when both Iraq and Kuwait were negotiating urea exports to China, world's largest buyer of this fertiliser. A spokesman for Rashtriya Chemicals and Fertilisers (RCF), the leading fertiliser producer in western India, said that though MMTC has informed the company about the the difficult times ahead, the company does not forsee the likelihood of having to cut back urea production in the near future. "We have back up supply from Deepak Fertiliser. Also, Kribhco has told us that they could spare 100 to 150 tonne a day for us", he said. Enquiries reveal that Gujarat Narmada Valley Fertiliser Company Ltd. (GNFC) will have little ammonia to spare as the company is to commence ammonium nitrophosphate (ANP) production soon. Zuari is a net importer. IFFCO imports through Kandla port. Government's plans to set up various fertiliser units in the Gulf to take advantage of cheap fuel prices in the region appear jinxed.

Deepak's Taloja unit is the only merchant producer of ammonia as it does not produce the downstream fertiliser products at present. The company has the largest storage tank for ammonia which will have lot of idle capacity when the company begins to produce ANP. Apart from infrastructure and utilities, the company also has an underutilised gas pipeline from ONGC's Uran facility to Taloja.

Deepak is currently selling ammonia to RCF and Zuari. Deepak's application envisaged merchant sale of 70 per cent of the ammonia to be produced at the new plant. Thirty per cent would be converted to value-added products exports. The project would have sav foreign exchange to the tune of dollar 15 million a year, the compa claimed. It has written to the gover ment seeking reconsideration of t application. The company, which su fered a labour unrest durin September-October last year, has be achieving more than 100 per cent capa ity utilisation in recent months. Produ tion for the period April 1, 1990 August 31, 1990 at 40,535 tonne is per cent more than that during the co responding period last year.

Sales turnover during the peric showed a 27 per cent increase. "Carr forward profits of last year exceed th dividend outgo", according to compan sources.

RAYALASEEMA ALKALIES

Sree Rayalaseema Alkalies an Allied Chemicals has produced goo results during the year ended Marc 1990. The turnover has more than dou bled to Rs. 24 crores from Rs. 11.1 crores in the previous year. The oper ating profit has also more than double to Rs. 7.65 crores from Rs. 3.79 crores Despite a significant rise in interest liab ility to Rs. 406.97 lakhs fron Rs. 182.09 lakhs, the gross profit ha shot up to Rs. 357.92 lakhs fron Rs. 196.84 lakhs last year.

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Petroleum prices not to be increased

The government decided on Sep-ember 12, not to increase the price of petrol and petroleum products or to introduce rationing of petrol for the present despite a projected additional burden of Rs. 3,000 crore in the crude import bill.

At an all-party meeting, convened by the Prime Minister to consider the situation arising out of the Gulf crisis, major political parties, including the ruling party allies the BJP and CPI and CPI-M, opposed any price hike on the grounds that it would have a cascading effect on the prices of essential commodities.

The meeting was also attended by the petroleum minister, Mr. M.S. Gurupadaswamy, his deputy, Mr. Bajaman Behera, steel and mines minister, Mr. Dinesh Goswamy and Parliamentary affairs minister, Mr. P. Upendra.

An official spokesman told newsmen at New Delhi that it was decided that another meeting be convened to discuss the difficult balance of payments position vis-a-vis the increased oil import bill and limited foreign exchanger resources against the backdrop of the Gulf crisis.

The Prime Minister, Mr. V.P. Singh, told the meeting how the Gulf crisis had affected the oil import bill straining the already difficult balance of payments position.

Mr. Singh told the parties that although no precise figure for foreign exchange required to meet the increased cost of oil imports could be given because of the fluctuating prices, a rough estimate put it at over Rs. 3,000 crores.

He asked the political leaders for suggestions on how best to meet the situation and raise the required resources. The Prime Minister said some of the recent decisions of the commerce ministry, like the transfer of some items to the OGL, would net Rs. 1,000 crore and another Rs. 800 crore would come from corporate levies.

Leaders of political parties felt that to tackle resources crunch measures should be taken to unearth black money and some taxes should be raised. However, they said, the people should be spared another petroleum product price hike.

The government had raised petroleum prices in the 1990-91 budget much before the Gulf crisis and the hike was the steepest since 1972. The petroleum and chemicals minister, Mr. M.S. Gurupadaswamy told the meeting that petroleum product imports had to be restricted to around 24.3 million tonnes as against last year's consumption level of 25.2 m.t.

Imports had to be pegged to last year's level of Rs. 6,400 crore, he said. The Gulf crisis had inflated the oil import bill following the upsurge in prices as supplies had got disrupted. Every dollar increase in the price of imported crude meant a foreign exchange outgo of Rs. 400 crores, he added.

Mr. Gurupadaswamy said the gap between demand and supply would still be unbridged, necessitating imports and in the context of the high prices of crude oil there was no other option but to restrict consumption to levels slightly below last year's and conserve petrol and diesel.

The impact of the Gulf crisis was not temporary and its effects would be there for some time to come, he said. Various conservation measures introduced by the goverment since June this year had a certain impact, he said.

The growth rate of LPG for April to August this year was placed at only 14.4 per cent against 15.6 per cent for 1989-90 and that of petrol 8.4 per c
against 14.4 per cent last year during
same period.

For high speed diesel oil, it was
at 5.8 per cent from April to August
year against 10.7 per cent last yea

RELIANCE HIKES PTA PRIC

Reliance Industries Limited (R
has hiked the price of purified tere
thalic acid (PTA) from the pres
Rs. 24,550 per tonne to Rs. 29,700
tonne.

According to RIL sources,
increase is attributed to the escalat
in cost of producing intermediates u
for PTA. The increase in PTA prices
RIL comes just a day after Bom
Dyeing increased the price of di-met
terephthalate from Rs. 23,500 per to
to Rs. 28,500/tonne.

The government, it will be recal
had asked both DMT and PTA prod
ers in February to reduce their price
Rs. 23,500 and Rs. 24,550 per tonne
that time, PTA was priced at Rs. 32,
per tonne.

RIL had agreed to reduce the F
price to the government-suggested l
under protest. After about six mon
both the DMT producer, Bom
Dyeing, and the PTA producer, F
have jacked up the prices. (Also see
56).

COAL IS THE ONLY ALTERNATIVE FOR INDIA: ENVIRON SECY.

In the context of the stagnating
and oil production in the country.
only alternative is coal, accordin
environment secretary, Mr. Mal
Prasad. Inaugurating a six-day cor
ence on "Energy planning for S
Asian countries", Mr. Prasad
nuclear energy would be a fairly ex
sive option in terms of ca
requirements and associated risks

Many combinations under DPCO

A large number of combination drugs ve been brought under price control altering their definitions. With mediate effect government has cided that there is no major or minor erapeutic ingredient in a combination rmulation and all ingredients have equal therapeutic value''. As such all mbination drugs containing even a ce of bulk drugs which are under ice control will come under the price gime.

The quiet move of the Ministry of etroleum & Chemicals only proves the oint of the drug industry that Mr. M.S. urupadaswamy cannot be taken for ranted. Under the earlier policy, a ombination drug could only come nder price control if the scheduled bulk rug in the combination formed a major herapeutic agent.

More, if the major agent was a drug tem falling in Category 1, the combiation drug fell in Category 1 and if the lrug item fell in Category 2, the comination drug came under Category 2. But, if the scheduled bulk drug was a minor therapeutic agent, the combination drug was kept out of price control. All these fine-tunings have been scrapped.

In a letter written to the Bureau of Industrial Costs and Prices the Ministry of Chemicals and Petroleum, states, the Standing Committee constituted by the ministry, had reexamined the issue and decided on the new move. The letter states, 'All such combination formulations containing Category 1 bulk drug will be treated as Category 1 formulation. Similarly combination formulations containing a Category 2 bulk drug with non-scheduled bulk drug will be treated as a Category 2 formulation''.

The Standing Committee has usurped to itself powers to define a drug which properly belongs to the Drugs Controller. It is the Drugs Controller, stationed in Delhi, who sanctions manufacture and sale of combination drugs with the powers of state drug controllers now pruned. Number of combination drugs falling under price control cannot be estimated as the various industry associations are collating data. They are upset with the government move and fits in with fears of the industry that the government is keen on keeping out the drug inddustry from the liberalisation plans.

When this move is fitted in with earlier government decision to bring more drugs under price control, it is clear DPCO 1987 stands considerably diluted.

NEW TREATMENT FOR CANCER

Human beings have been treated with genetically engineered cells for the first time. Scientists say the study could herald treatment for a wide range of diseases originating in the molecular building blocks of life.

The study, involving five patients with malignant skin cancer, introduced genetic material into cells taken from human volunteers and reinjected them back into the subjects.

The test, reported recently in New England Journal of Medicine, was not designed to eliminate the tumours but to help researchers understand how to make the promising cancer treatment of genetic engineering even more effective.

Two of the patients enjoyed full or partial remissions. There were no unusual side effects and tests showed that the modified cells persisted in the circulation and at the tumour site for upto two months. ''Until now, we were uncertain if gene-modified cells could survive in the patient's body long enough to be useful for therapy'', said the Director of the study, Dr. Steven A. Rosenberg of the U.S. National Cancer Institute.

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Hoechst moves court against Govt. claims

Hoechst India Limited has filed a petition against the Union Government in the Delhi high court on Aug 31st. It appealed against the government directive that the company has to pay Rs. 25 crore as arrrears under the Drug Price Equalisation Amount (DPEA), Mr. C.L. Jain, director of Hoechst revealed.

The government issued three notices to the company on May 30, 1990. It alleged that Hoechst had earned unintended profits in the formulation of three drugs, baralgan ketone, frusemide and pheniramine maleate between 1979-85.

Earlier Hoechst had written to the ministry of chemicals and petrochemicals to review its claims. Since the ministry has not responded to the letters, the company has been forced to take the matter to court.

The court has postponed the hearing for the case to September 26, Mr. Jain said.

Glaxo India Limited filed a similar case against the government in July. It claims that the ministry must pay Rs. 37 crore as compensation for unintended losses during 1981-87.

The amount, Glaxo appealed, should be set off against the government's claim of Rs. 66.35 crore against the company. The demand notice for Glaxo was issued on June 26. Another multinational, Cyanamid India Limited has been served with notices for Rs. 5.37 crore. It has not yet appealed against the government order.

Meanwhile the minister for petroleum and chemicals, Mr. M.S. Gurupadaswamy assured the Lok Sabha on Sep 4th, that the government would take all steps to recover the amount due under the DPEA.

The government has issued notices for nearly Rs. 176 crore to the drug firms under the Drug Price Control Order (DPCO) 1979. Under the DPCO 1987, the ministry abolished DPEA payments. However, it retains the right to recover amounts due for the period 1980-87.

At an earlier meeting with drug controllers on July 26, Mr. Gurupadaswamy indicated that the government may recover the amounts through drastic measures. He plans to confer additional powers to the controllers to ensure the recovery of arrears.

The industry has indicated several set-offs to the amounts calculated by the government as unintended profits. The joint council of pharmaceutical industry and trade had put this forward as one of it demands to the ministry.

The council consists of Organisation of Pharmaceutical Producers of India (OPPI), Indian Drug Manufacturers Association (IDMA), Pharmaceutical and Allied Manufacturers' Association (PAMDAL), and the All India Organisation of Chemists and Druggists (AICOD).

In claims that government demands for compensation sums are unjustified. Several firms have suffered unintended losses which need to be set off against the arrear claims.

At a press conference last month, the council members claimed that the minister has agreed to consider their demands. At this instance, the council withdrew its call for an all-India bandh of trade and industry.

MARINE CHEMICAL COMPLEX AT TUTICORIN PLANNED

A proposal to develop a marine chemical complex at Tuticorin to utilise profitably the bittern available from the salt factories there is engaging the attention of the Tamil Nadu government.

The idea is to promote a group of units, both medium and small in complex, with processing facilities extract valuable chemicals like magn ium sulphate, magnesium chloride a potassium choride from bittern. present, a large quantity of bitte which is nothing but the mother liqu left in the beds after the salt is remov is dumped back into the sea.

According to salt industry experts, every tonne of salt produced, nearly tonne to 0.8 tonne of bittern is availab The State occupies a premier positi in salt production with an annual outp ranging between 18 and 20 tonnes, ne only to Gujarat.

As Tuticorin is the major cent accounting for almost 50 per cent of t total production, it is considered as t most ideal place for the complex.

The other centres are spread over t six coastal districts of South Arco Thanjavur, Pudukottai, Ramanathapu ram, Chidambaranar and Kanyakuma Although there is plenty of scope f setting up salt-based chemical units these districts, the potential h remained largely untapped. Apart fro a handful of units for making caust soda and soda ash, there are no sizeab investments.

In the case of exploiting bittern, th situation is even worse. The only initia tive in this area, which is worthy c mention is the magnesium metal proje at Valinokkam in Ramanathapuran promoted by Tamil Nadu Magnesiur and Marine Chemical Ltd.

The bittern from the nearby factor of Tamil Nadu Salt Corporation is pu to profitable use there.

Enthused by the success of this ven ture, the state government is keen t encourage new units in this sector. It i learnt that the idea is being actively sol to industrialists, both in and outside th State. Efforts are on to rope in NR investments too.

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RIL, Bombay Dyeing set to hike PTA, DMT prices

Reliance Industries Ltd. and Bombay Dyeing are preparing to hike end-prices of purified terephthalic acid (PTA) and dimethyl terephthalate (DMT), respectively. Reliance, as a prelude to raising prices, has already informed major PTA users about its inability to continue regular supplies.

The hike in the prices of the two petrochemical intermediates is likely to be effected in a month's time. The sole reason for the price increase is the continuing Gulf crisis and hardening international crude prices.

Paraxylene, a vital raw material for both PTA and DMT, has suddenly disappeared from the international market. Wherever it is available, the f.o.b. prices, is higher than what it was one month ago by nearly $ 300 a tonne. This is the same paraxylene that has been carried over from the second quarter as surplus stocks.

As a result of the uncertainty in the international market over crude prices and supplies, and the attendant fallout on naphtha, paraxylene is suddenly in short-supply. Bombay Dyeing, which purchased 4,000 tonne of paraxylene in June at around $ 425 on c and f basis, recently entered the market and booked supplies till December at $ 600.

Bombay Dyeing's basic DMT prices at present work out to Rs. 24,000 per tonne, which is based on the c and f price of around $ 542. With Bombay Dyeing now paying $ 600, its DMT prices are also bound to go up. The new basic price for DMT is around Rs. 28,000 per tonne, exclusive of excise and central sales tax.

With the Union government still unable to cope with the mounting need for foreign exchange to import crude, both Reliance and Bombay Dyeing have been asked to import paraxylene only against Rep licences, Bombay Dyeing bought Rep licences from the open market at a premium to obtain the additional paraxylene.

However, it is not clear why Reliance wants to enter the international markets for paraxylene as it has been insisting all along on stopping imports. Reliance has informed its PTA users that owing to the Gulf problem and the 10 per cent cut on naptha supplies from domestic producers imposed at the behest of the Union government — the company is facing problems is manufacturing paraxylene and, therefore, PTA.

The PTA supplied by RIL has a basic price tag of Rs. 24,450 per tonne, plus excise and central sales tax. With Bombay Dyeing all set to jack up DMT prices in another month, Reliance might take this opportunity to hike PTA prices also. As it is, the 10 per cent cut on naphtha allocation, based on the average consumption of the last three years, is not likely to affect RIL's production much. However, Reliance feels that the 10 per cent cut will in additional outgo of foreign exchange for import of value-added items.

International prices of paraxylene are hovering around $ 700 per tonne f.o.b. Ex-Rotterdam. The landed cost works out to around $ 750. This is almost double the $ 365 f.o.b. ex-Rotterdam paid by Indian Petrochemicals Corporation in June. Immediately after Iraq attacked Kuwait, prices climbed to $ 500.

Both IPCL and Bongaigaon refinery are charging a basic price of Rs. 26,000 per tonne for their DMT. It is quite likely that with crude at a premium and naphtha supplies to the IPCL plant greatly reduced, both IPCL and Bongaigaon Refinery will also raise their DMT prices. The Union government, however, has washed its hands of the
entire affair and has asked the m
producers to do anything they
including purchasing REP licences f
the open market.

ANALISA 90

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tion has organised a Seminar and Ex
bition on Analytical Instrumentatio
Process Industries, at HOTEL CE
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and 29th September, 1990. Chief Gu
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Thane Belapur Industries Associati
Mr. M.G. Nayak, Dy. Secretary, (Te
nical Education) Government of Mal
rashtra has given his consented to
Guest of Honour. Keynote Speaker w
be Mr. B.B. Chopane, Director
Technical Education, Maharashtra Sta

The seminar timings are from 9 A.
to 5 P.M. and the Exhibition timings a
from 10 A.M. to 7 P.M. on both
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HDPE, MEG & LAB PROJECTS

Rs. 27-cr bank guarantees sought from RIL, RPL

The customs department in Bombay has asked Reliance Industries Limited (RIL) and Reliance Petrochemicals Limited (RPL) to give bank guarantees totalling Rs. 27 crore for three of their projects.

The projects for which the bank guarantees have been asked are: high density polyethylene (HDPE), mono ethylene glycol (MEG), (both of RPL) and linear alkyl benzene (LAB) of RIL. While for the HDPE project bank guarantee is asked to the tune of Rs. 20 crore, for the MEG it is Rs. 2.5 crore and for the LAB project it is Rs. four crore.

Besides the guarantee customs has also asked RIL and RPL for a provisional duty bond (P.D. bond) and import trade control (ITC) bond. In the case of the HDPE project the P.D. bond asked for was to the tune of Rs. 137 as also the ITC bond. In the case of the MEG project P.D. bond asked was Rs. 58 crore while there was no ITC bond. In the LAB project Rs. 30 crore was asked as P.D. bond and Rs. 17 crore was asked as the ITC bond.

The bank guarantees come in the wake of certain imports by the Reliance group which created some doubts among the customs officials. In the case of the MEG project at Hazira, near Surat, officials came to know that in 1985 Reliance had come to an agreement with Chemtex of Japan for the supply of an MEG plant with a capacity of 40,000 mta which totalled a cost of Rs. 37.5 crore and know-how fees to the tune of Rs. 4.10 crore.

But Reliance got into an agreement with Lummus Crest, Netherlands, for the supply of an MEG plant of 60,000 mta for nitrogen ballast and a capacity of 80,000 MTA methane ballast. Reliance declared the price to customs as similar to that of the plant they were earlier negotiating with Chemtex, Japan. This was despite the fact that capacity had risen by 50 per cent. The only difference in payment was that in case of Lummus Crest the know-how fees had jumped to about $ 3.6 million.

Customs pointed out that the higher capacity plant should cost higher as per international norms. Besides, the know-how fees had been hiked indicating that the capacity too must have been enlarged. Reliance explained that in the deal with Chemtex, the MEG plant to be acquired was of 60,000 mta which was to be scaled down to 40,000 mta and this would result in saving in equipment cost. Despite these objections, the contract was allowed to be registered provisionally after some provisional value addition. Plant and machinery imported in this case was cleared after filing the bonds and the bank guarantee.

For the MEG plant, customs had asked for a Rs. 50 lakhs cash deposit which Reliance pleaded it was unable to furnish and instead a bank guarantee was taken. In the case of the HDPE project, also situated at Hazira, the company applied in 1989 for registration of a contract for plant capacity of 50,000 mta. The suppliers were once again Lummus Crest and technology was from Du Pont, USA.

Initial scrutiny of the documents showed prima facie evidence that capacity of the HDPE plant would be 1.2 lakh mta instead of 50,000 mta. Custom further observed that while Reliance had an industrial licence for HDPE, it could along with Du Pont's "swing technology" produce low density polyethylene (LDPE).

Thus customs provisionally registered the contract and charged the due payment of the two bonds and the ba guarantee. It is learnt that Reliance trying for DGTD permission for a c lakh mta HDPE plant. In the linear alk benzene (LAB) plant at Patalgan Maharashtra, there were to be t phases to the plant. In the first phas paraffin was to be manufactured fro the raw material kerosene. In the seco phase, LAB was to be manufactur from raw material paraffin. Thus wh the two plants were integrated, the ra material would be kerosene and e product LAB, while the intermedia product would be paraffin.

Again customs officals, suspect th phase-two, which has been installe before the phase-one was of a muc higher capacity than the declared 50,00 mta. On the basis of serious productio data available on different document relating to phase-two, customs feel tha the capacity of the phase-one plant wi be higher. In this case too, provisiona registration of the contract has been offered.

Customs have launched a thoroug investigation into the three projects. A in the case of the purified terephthali acid (PTA) plant investigations, customs is expected to take proper action afte the plants are completed and importation complete.

It may be recalled that the customs department had issued a show cause notice to RIL in 1987 for allegedly evading Rs. 120 crore worth of duty by wrongly declaring the capacity of the polyester filament yarn (PFY) plant by bringing in 12 spinning machines instead of the permitted eight.

In 1990 customs issued another show cause notice for wrong declarations of the capacity of the PTA plant and duty evasion thereby to the tune of Rs. 174 crore. In the PFY case Delhi High Court has adjourned the proceedings till March 1991 and in the PTA case the RIL has yet to file it's reply to the show cause notice.

SPIC to modernise fertiliser plant

The Southern Petrochemical Indus-es Corporation Limited's (SPIC) pro-amme of modernisation of its fertiliser oject at Spic Nagar in the port town Tuticorin was inaugurated on Aug st by Mr. M. Karunanidhi, Chief inister of Tamil Nadu.

The Rs. 160-crore scheme is aimed modernising plants that have been in eration for the last 15 years. The esent modernisation is expected to tend plant life by another 15 years.

A major feature of modernisation is e addition of a 10,000 tonne ammonia orage facility costing Rs. 13 crores. his will facilitate a thorough inspection f the existing tank which is a safety equirement and will also lend stability the existing operations. The upgra-ation schemes in ammonia, urea and tility plants will cost about Rs. 121 rores and this will include schemes for eplacement of major equipment, adop-ion of the latest concepts in a few sec-ions of the plants and the conversion f pneumatic control systems into state f the art distributed digital control ystem. A Rs. 11 crore conversion of he existing sulphuric acid plant into louble contact double absorption ystem will ensure much less emission nd also improve the efficiency of the rocess.

For the second line SPIC is going to set up pipe reactor technology. This was pioneered by the company in the country and the second project will cost Rs. 15 crores. This will increase the production capacity by atleast 30 per cent in addition to reducing the energy consumption levels.

REICHHOLD CHEMICALS INDIA: CENTRE ALLOWS 40 pc STAKE TO ITALIAN CO

The Union Government has okayed the purchase of 40 per cent stake in Reichhold Chemicals India Ltd., a Madras-based sick company, by Montedipe of Italy.

Montedipe, belonging to Enimont group of companies, has bought the equity from an Indian who is now an American citizen. The remaining 60 per cent equity has been picked up by UB group, Montedipe's Indian associates. Promoted originally by the Amalgamation group, Reichhold manufactures unsatured polyester and phenolic resins. Under UB management, the company claims to have improved its performance and is close to breaking even.

With Montedipe's backing, Reichhold now plans to venture into new areas. The company has received a letter of intent to manufacture 2,000 tonnes of polyurethane surfactants. As for polyols, UB has systems. This is part of the UB group's plan to diversify into the entire range of polyurethane chemicals.

BENGAL DRUG MAKERS FOR 'SINGLE WINDOWS'

The West Bengal Small Scale Drug Manufacturers and Traders' Association has called for opening of single windows at SSI where all information regarding a small unit would be available, so that government inspectors would not have to visit the units every now and then. Interestingly, the association has demanded that self-employment schemes be legalised for SSI units in respect of marketing for job creation and opening up of rural markets for manufacturing SSI units. It has also pleaded for total exemption of all small scale drug formulation units from the drug price control order (DPCO) as they lack the resources and expertise to tackle the formalities relating to DPCO. For determination of small scale status, the association has demanded an upward revision of the turnover ceiling to Rs. ten crores at current market prices.

As far as excise in concerned, the association has demanded upward revision of the exemption limit to Rs. on crore and slabwise benefit to Rs. fiv crores. Filing of gate passes should als be restricted to once a month instead o the present system of thrice a month.

The association has welcomed th move by the minister of state for small scale, agro and rural industries Mr. Srikant Jena to constitute a committee t simplify procedures relating to smal industry through reduction in paperwork, number of returns and visits b government inspectors.

SHRI M.S. GURUPADASWAMY TO INAUGURATE ICMA AGM

The Fiftieth Annual General Meeting of the Indian Chemical Manufacturers Association (ICMA) will be held at Calcutta on Saturday, the 22nd September 1990. Shri M.S. Gurupadaswamy, Union Minister for Petroleum & Chemicals will inaugurate the function and give away the ICMA Awards for 1989. The ICMA, for the first time, has instituted a Special Award for Individual for outstanding contribution to the Chemical Industry and the same will be presented to Prof. M.M. Sharma, FRS, Director, Department of Chemical Technology, University of Bombay, on this occasion.

N-POWER UNIT SAFE

The Tamil Nadu chief Minister, Mr. M. Karunanidhi, has allayed fears about the environmental hazards in the wake of the proposed atomic power station at Koodangulam in the Nellai Kattabomman district of the state. Laying the stone for the Rs. 160-crore joint sector-SPIC modernisation project on September 8th the chief minister said, adequate preventive and precautionary steps would be taken to ensure that the water supply and irrigation in the area was not affected. Pointing out that the state government had allotted Rs. 450 crores for power generation, he claimed that Tamil Nadu at present was the only state without any power cut.

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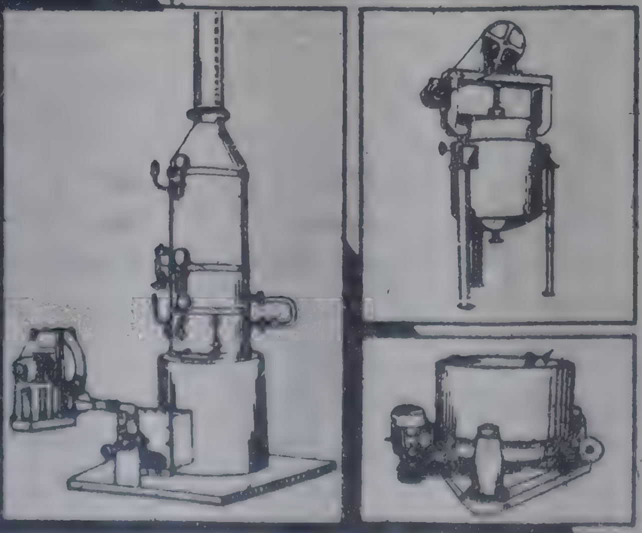

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BABRALA FERTILISER PROJECT

Tatas offer to refund money

In a precedent setting move, Tata Chemicals has offered to return the money to be collected from the public for its proposed fertiliser plant at Babrala, if it fails to implement the project. The company plans to mobilise Rs. 400 crores worth of rights and public issues of partly convertible debentures for a total face value of Rs. 400.37 crores.

According to corporate circles in Delhi, it is the first time that a company is offering to return the money in case of non-implementation of a project. There are "very few" instances where companies have returned money to investors. The company law procedure for return of public money is complicated as it involves cutting down the equity base of a company.

Projects are often substantially modified after a public issue, but funds are rarely returned. Mr. Darbari Seth, chairman and managing director, said that the offer to return the money has nothing to do with the controversy over supply of gas to his fertiliser unit. Mr. Seth along with Mr. K.K. Birla refused to sign a gas supply contract with the Gas Authority of India Ltd. (GAIL) on the grounds that the contract was unfair and patently biased.

Eventually, a restraint order had to be obtained from the Delhi high court in the face of a deadline from the Union government that the gas allocation to the two units will be cancelled if they do not sign the contract. There were also reports that the government was even thinking of cancelling the letters of intent for the project.

Mr. Seth stated that he would not
back out of the fertiliser project. "V
have categorically stated that we sh
sign a judicially determined, fair a
reasonable gas supply contract'
According to Mr. Seth, the money w
be mobilised explicitly for the fertilis
project and to lend credence to th
claim, Tata Chemicals has decided
return the money if the project is not u
"We believe in certain values an
would not like to follow the exampl
of those who mobilise money for o
project but end up using it for somethi
else". He said that he believes in inno
ative ideas. "The open offer for Co
solidated Coffee Ltd., (CCL) shares
an example", Mr. Seth stated.

In an innovative takeover bid, M
Seth had offered CCL shareholders on
Tata Tea share at Rs. 100 in cash fo
every two shares of CCL. The offe
received an overwhelming respons
from CCL shareholders.

Mr. Seth admitted that the project's implementation had been delayed but said that this had been for reasons over which they have no control. "During the two years from June 1988 to June 1990, our project cost increased from Rs. 765 crore to Rs. 980 crores", he said.

"The new gas-based fertiliser projects cannot be blamed for the flaring of associated gas. The gas that is being flared would not have diminished even if all the gas-based fertiliser plants were in operation today because the volume of associated gas vastly increased on account of over-exploitation of the country's limited oil reserves.

The lack of means (and will) to gather and use this gas and the fact that GAIL could now have supplied to the fertiliser plants would have been only the free gas from Bassein", Mr. Seth said.

Mr. Seth had proposed the issue in October last year. But because of the change in government, the consent was delayed.

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ndustry-research units interaction vital

The President, Mr. R. Venkataraman, : called for greater interaction ween industry and research institu- ns in the interest of economic deve- ment of the country.

Speaking at the silver jubilee celebra- ns of the Birla Institute of Techno- gy and Science (BITS) on Sept. 9th : President regretted the 'woefully adequate' linkage between the univer- ies and technology institutions on the e hand and the industry on the other.

Massive investments made in search laboratories and technical insti- tions would be 'wasted' unless indus- / referred its problems to them for a lution and had an interaction. Mr. enkataraman said the urge to cut costs, nprove productivity and quality was issing in entrepreneurs since they have ved in a sheltered sellers' market, ithout either internal or external com- etition. As a result, the painstaking work in the universities and laboratories had remained largely dormant, not finding application in the production of goods and services.

'This phenomenon has also led to a sense of frustration among research scientists who feel the results of their research are ignored by industry', the President said.

Industry has also done little by way of promoting in-house research and development activities.

Stating that there was no limit to the possibilities of invention and adaptation of science for human welfare, Mr. Venkataraman exhorted the youth to rebel against the status quo and meek acceptance of existing conditions. 'They should aspire to become Faradays, Edisons and Marconis and so on'.

Mr. Venkataraman also called for harnessing science and technology fo human development and application t day to day problems.

Refering to technology imports, he said, 'the habit of looking for assistance from abroad has not left us'. Constant and continuous import of technology had impeded the country's scientific development, the President said.

Though import of the latest technology was unavoidable, it was important to acquire them and make suitable innovations so that the country was not obliged to import every later development on the imported technology.

Mr. Venkataraman referred to the country's success in agricultural production which had evoked the admiration of many developing and even developed countries. He also inaugurated the centre for research on education, innovation and institutional development located at the BITS complex.

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ONGC slashes crude production

The Oil and Natural Gas Commission ONGC) has been forced to slash its crude-production target for the current year by between 500,000 to 700,000 tonnes.

This comes when the government is facing an unpecedented foreign exchange crisis, forcing it to slash import of crude and petroleum products from the international market.

The ONGC had originally set a target of 33 million tonnes of crude in 1990-91. According to official sources, the ONGC has informed the ministry of petroleum and chemicals that it would not be able to produce more than 32.3 million tonnes beecause of factors beyond ONGC's control.

Oil industry circles say the original target was below the ONGC's production capacity. The opitimal utilisation of capacity has been made impossible by the "wrong priorities" of the government.

The government has sunk considerable capital into creating production facilities in south Bassein, the largest gas field, and the HBJ gas pipeline, which remain underutilised. Had the government spent a few hundred crores in the North East and Gujarat to create additional refinery and crude transportation facilities, the ONGC would have been able to produce more crude from these areas.

In fact, it had set a target of 4.1 million tonnes of crude from Assam last year, but was forced to reduce the target to 3.1 million tonnes on account of "refinery constraints".

In Gujarat, the ONGC has been asked to restrict its production as the existing refinery cannot process all the crude. The Koyali refinery of IOC cannot process more than 4.7 million tonnes of north Gujarat crude and there are no transportation facilities for the surplus south Gujarat crude. The surplus crude in Gujarat is estimated at 1.05 million tonnes in 1990-91, which will rise to 3.6 million tonnes in 1994-95. The ONGC will have to restrict its production from north and south Gujarat till the government decides to set up additional refining capacity.

The present crisis is on account of low sulphur heavy stock (LSHS) piling up at Koyali refinery. According to the IOC, the offtake of LSHS has come down from 7500 tonnes a day to 6000 tonnes a day. This has forced the IOC to reduce the intake of crude from north Gujarat, which has high LSHS content. This in turn, made the ONGC cut back production by 0.12 million tonnes in the first quarter of the current year. A total shortfall of 0.5 to 0.6 million tonnes is expected from Gujarat during the year.

In Assam, the recent oil blockade and frequent bandhs have played havoc with the ONGC's production programme. The ONGC has told the government that there would be a production shortfall of 0.16 million tonnes from Assam this year. Meanwhile the Committee on Public Undertakings (COPU) has charged the Oil and Natural Gas Commission (ONGC) with lack of proper planning and co-ordination on its part in the construction and utilisation of two platforms, which resulted in drainage of foreign exchange of Rs. 22.55 crore and loss of addtional production valued at $42.24 million.

ONGC FLAYED FOR EXCHANGE DRAIN

The public undertakings committee has charged the Oil and Natural Gas Commission with " lack of proper planning and coordination" in the construction and utilisation of two platforms, which resulted in drainage of foreign exchange worth Rs. 22.55 crore and loss of production worth $ 42.24 million. The committee has said fabrication of platforms NR-1 and NH for Bombay High was to start from, November 1, 1983, and May 1, 1984, respectively as part of the accelerated production of 63.14 million tonnes of oil. But this was subsequently modified to produce an additional 1.32 million barrels of oil and the platforms were required to be completed before the monsoon of 1983 as per modified plan.

The contract of fabrication and installation of the platforms was awarded to Mazagon dock and after it informed ONGC that it could complete the work only by October/November 1983, the corporation called the tenders in May, 1982, for completion of the work by April 30, 1983.

Since there were no bidders, a revised tender was floated and the contract was finally awarded in September, 1982 a the revised price of $ 23.388 million (about Rs. 22.52 crore) for completion of the platforms by May 7, 1983, in order to have four months earlier production equivalent to 1.32 million barrels. Despite the fact that work on both platforms was actually completed as pe schedule, ONGC could take up drilling on the NH platform only in May 1984 and on NR-1 in November, 1984. Thu the whole purpose of spending a enorrmous amount of foreign exchang was lost since Mazagon Dock had offered to finish the job in October/November 1983 itself, the report said.

The report also rapped ONGC for th delay in starting production on NH an NR-1 platforms and for its false clain that this was due to non-availability c rigs as the Sagar Vikas rig had blow out. It said that at the time of awardin the contract, ONGC was fully aware c the shortage of one rig and the eventua consequences. The commission however, persisted with the approach c having these platforms complete before the monsoon of 1983,"witho making any serious efforts for acqui ing an additional rig in place of Sag Vikas and remained sitting on the fal hope of recommissioning of this rig'

Gujarat backs Rs. 1,900 crore export oriented oil refinery proposal

A 100 per cent, export-oriented oil finery has been mooted by the Gujat state government to earn foreign change of an estimated Rs. 7,000 ores in the next ten years. The proosed refinery, to be set up at Vadinar ort on the Saurashtra coast, is expected cost more than Rs. 1,900 crores. It ill have a capcity of 9 million tonnes er annum and will have a tie-up with echtel Inc., USA.

Initially, the project was envisaged by e Essar Group, having expertise in gas xploration, off-shore oil and shipping, ut the state government has suggested the Centre that it will have an equity articipation and the project can be set p as a joint venture. The project has een submitted by the Chief Minister, Ir. Chimanbhai Patel to the Prime Iinsiter, Mr. V.P. Singh, for early learance by the Centre so that other ormalities can be expedited.

The project, which will involve an stimated foreign exchange of Rs. 700 rores, is expected to be completed in 6 months. Against this, the refinery is xpected to earn foreign exchange vorth Rs. 3,000 crores in the first five ears and another Rs. 4,000 crores etween the sixth and tenth year.

In his personal discussion with the rime Minister in Delhi, the Chief Iinister has pointed out that the state overnment has not only accorded highst priority to the project but has also ubmitted a proposal to the ministry of etroleum and chemicals and the comnerce ministry for early approval. At resent, the proposal is to be considered y the special board under the ministry f commerce.

The project envisages import of crude il from Gulf countries and export of rocessed products to both eastern and vestern countries. In his note to Mr. Singh, the Chief Minister has pointed out that the sponsor of the project have been able to obtained support from international companies like Aramco, Saudi Arabian Marketing and Refining Co., British Petroleum and Caltex for the supply of crude oil.

Describing the projects as "extremely attractive" in terms of foreign exchange earnings, the Chief Minister pointed out that the settting up of the refinery on the Saurashtra coast would open up many opportunities. It will not only provide employment to skilled and semi-skilled people but also open the doors for ancillary industries to supply various spare parts and components required in the refinery. he added.

Moreover, the note submitted by the Chief Minister also points out that the shipping industry will get a big boost by transporting the crude oil, almost 9 million tonnes per year in the country as well as exporting the end products. At the same time, it will also help transport in Saurashtra and will provide employment which will arise due to the development of a new harbour at Vadinar.

Explaining the financial viability of the project, the note said that the foreign exchange of Rs. 500 crores would be required during the construction phase and another Rs. 200 crores in the first year of operating phase. But the refinery will start earning foreign exchange of Rs. 792 crores from the third year of its operation.

In subsequent years, it will earn foreign exchange of Rs. 810 crores and Rs. 814 crores. During the sixth and tenth years of its commissioning, the refinery is estimated to earn Rs. 4,000 crores. During his recent visit to the USA and the UK the chief secretary, Mr. H.K. Khan, held discussions with NRI's for their equity participation. According to a rough estimate, NRIs may invest around Rs. 70 crores in th project.

The Chief Minister's note said tha the demand picture in the Asia-Pacifi region would be around 3.5 million barrels per day as against the productio growth of only one million barrels pe day. This gap could partially be fille by the Vadinar refinery.

The Chief Minister wanted Mr. Singh to expedite the process of clearance o the project so that escalation of cos could be minimised.

CRUDE OIL PRICE UP 50% IN A MONTH

In the one month of the Gulf crisis the price of crude oil in the international market has risen by a clear 50 per cent over the price that was prevailing prior to the Iraqi invasion of Kuwait.

On the evening of August 1 the price of oil in the major markets closed at $ 18 a barrel and when oil markets closed on Friday, August 31 the price of oil had escalated to $ 27 and 60 cents a barrel with oil industry analysts saying that the price would soon surpass the $ 30 a barrel level.

The past month of the Gulf crisis saw the price of oil fluctuate from day to day in direct correlation to the military tensions in the Gulf. As the fear of war heightened in the first half of August, oil prices broke all records of the past 10 years and started to edge up to the $ 40 a barrel mark.

This steep climb was corrected by an OPEC decision in the last week of August to increase production by 4 million barrels a day. On August 29 oil prices fell by $ 2 and 30 cents a barrel.

But then again as uncertainty loomed large over the Gulf the market closed on Friday, August 31 up by $1 and sixty cents a barrel to close at $ 27 and 60 cents.

USSR oil exports face hitches

The Soviet Union, hungry for hard currency, is reaping a windfall from higher oil prices and would like to increase exports to take advantage of shortages caused by the West Asia crisis, but it can't. The problem is an antiquated and long mismanaged Soviet petroleum industry unable to boost production. It may yield 500,000 fewer barrels a day this year than last, western analysis say.

The Soviet Union produced about 12.1 million barrels of oil a day last year, a sixth of the world's total and more than Saudi Arabia, Iraq and Kuwait combined. It exported 3.7 million barrels a day — more than Iraq —with about half going to the west.

"They are producing at maximum capacity and their production is declining. There's no way they can get increased production, said John Lichtblau, chairman of the Petroleum Industry Research Foundation.

Not only is the Soviet industry unable to boost production, its problems with nuclear reactors have added to the domestic demand. The Soviet Union's appetite for oil is second only to the United States.

Deliveries of bargain-rate Soviet oil supplies to Cuba, averaging about 90 million barrels annually, already are being reduced. U.S. Experts acknowledge that the Soviets are expected to gain hundreds of millions of dollar in additional hard currency in the coming months if the higher oil prices stand.

NOCIL'S THANE PLANT SHUT DOWN

The Thane plant of National Organic Chemical Industries Ltd. (NOCIL), has been shut down following the breakdown of the compressor on August 28. The company is procuring spare part and expects to commission the plan within a fortnight. The cause of th compressor failure is being investigate Much of the plant equipment is very ol The compressor, for example, has bee in operation for 29 years and has neve failed in the past.

GILLANDERS PLANS TO DIVERSIFY

Gillanders Arbuthnot and Compan will diversify its activities and is mo likely to invest in textiles and petr chemicals. The company has appointe consultants to short-list 10 sectors an prepare feasibility reports.

The company will select two or thre fields for investment. Most of the ne units will be set up in West Bengal an Assam. At the annual general meetin in Calcutta, recently the shareholde passed a special resolution on the company's diversification plan.

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IPPAGE IN START-UP SCHEDULE

Reliance Petro needs Rs. 750 cr. more

Reliance Petrochemicals wants to ke a set of radical steps at its annual neral meeting to be held on Sep- mber 27. The meeting is of extraor- nary significance.

But not many shareholders will be ound to attend it. It is planned to be eld in the small town of Nanpura, hich lies in the Surat district of Guj- rat.

One of the several crucial moves PL will be making at the AGM is to o for a huge borrowing — of Rs. 750 rores. As per Resolution six of the GM notice, the company wants to be mpowered to borrow Rs. 750 crores hrough debentures, term loans, leasing, sset credit schemes and other means.

And why does RPL need so much of dditional money? Because its project o produce three petrochemical products MEG, PVC and HDPE) have overshot he orginal estimates.

Exactly two years ago, RPL had aised about Rs. 600 crores from the tockmarket to finance this project. That tself was way above the original cost of around Rs. 350 crores.

According to its earlier claims it is supposed to be close to commissioning the project by now. Strangely, it actually needs additional funding of Rs. 750 crores.

It has sought to justify this by arguing that the MEG capacity now as per government's order of minimum economic size will be 100,000 tonnes in place of 60,000 tonnes and HDPE capacity will be 100,000 tonnes in place of the 50,000 tonnes planned earlier.

Besides, the company is constructing a "captive gas-based power plant and a jetty for handling ethylene and other products," says the explanatory statement to the notice.

However, it does not provide any clue to how much of the cost increase is due to the power plant, captive jetty and the capacity increases of the three plants.

According to various industry sources, RPL's requirement of power should not be more than 40 mega watts. A gas-based plant of that size should cost around Rs. 50 crores. An ethylene-handling jetty could cost up to Rs. 30 crores or so. This means that over Rs. 650 crores is being spent simply to hike the capacities of the MEG and HDPE plants.

Sources in the petrochemical industry are intrigued by this huge expenditure. Finolex Pipes, which will go into production two years later, is planning a project to produce 20 MW of power, 100,000 tonnes of PVC and the required caustic/chlorine (included in RPL's project too) — all for just Rs. 352 crores. Included too, is a jetty to handle imported ethylene or ethylene dichloride.

Interestingly, contrary to what the company had claimed earlier, the project is going to suffer a huge time overrun. This is crucial because in the past Reliance group has consistently claimed credit for having implemented projects well within schedules. The company was supposed to be starting its project by now — 24 months after it raised money. The RPL annual report has Mr. Dhirubhai Ambani telling shareholders that the plant to make MEG will be commissioned only by the first quarter of 1991.

And the plants to make PVC and HDPE will be only "mechanically completed" in the first quarter of 1991. Significantly, the additional spending for the project has got the nod from financial institutions led by the Industrial Credit and Investment Corporation of India (ICICI).

In an interesting move, RPL is askin shareholders to pass a resolution t enable the board of directors to mak charitable contribution or donation.

It wants to give away money fo funds "not directly relating to the business of the company or to the welfare of its employees". The amount it wants to spend can go up to 5 per cent of the company average net profits for the previous three years.

OIL PRICE RISE MAY HIT POOR NATIONS

The industrial countries are better placed to deal with the increase in oil price in the wake of the Gulf crisis but the majority of developing nations are less well positioned.

According to a preliminary World Bank study developing countries will find it difficult to raise the additional resources to meet the higher cost of oil imports and larger interest payments on their variable rate external debts.

Commercial banks are reluctant to increase their exposure to heavily-indebted nations and many of the poorer developing countries will find it difficult to gain access to international financial markets. The burden of economic adjustment will, threfore, have to fall on domestic policy measures, with serious consequences for growth and development the study adds.

Compared to 1973 and 1979, the World Bank study points out, the oil price increase is likely to be modest.

NALCO EXPORTS

National Aluminium Company Ltd. (NALCO) achieved a major milestone last month-end when the company's alumina exports crossed one million tonne mark since 1988.

Proposal to raise refining capacity

The Petroleum Minister, Mr. M.S. Gurupadaswamy, told the Lok Sabha recently that it was not possible to estimate precisely the additonal expenditure likely to be incurred in the current year on oil imports due to oil price increase.

This was because of the prevailing volatile price situation and uncertainty regarding supply, Mr. Gurupadaswamy told Dr. K.P. Bopche and Mr. Babanrao Dhakne in a written reply. He said measures were being taken to achieve economy in expenditure involving foreign exchange, restrict imports and increase exports, contain demand of petroleum products to reasonable levels besides accelerating disbursement of external assistance.

He said there are proposals for increasing the refining capacity through debottlenecking of existing refineries and also for setting up of new grassroot refineries. It is also proposed to augment the motor spirit production at the existing refineries by installing reformers and debottlenecking of existing fluid catalytic crackers. Some of the proposals for new refineries include facilities for producing motor spirit.

Petrol consumption

During 1989-90, petroleum consumption was 3.4 million tonnes and consumption of all petroleum products was 5.3 million tonnes, Mr. Gurupadaswamy told Mr. K.D. Sultanpuri in a written reply. He said it was estimated that a saving of about 1.8 million tonnes of petroleum products could be achieved during July 1990 to March 1991 through measures announced on June 21 this year.

The petrochemical complex near Hazira in Gujarat, though considered as a joint venture between the Centre and the Gujarat Government did not materialise due to resource constraints the Minister told Mr. C.D. Gamit.

There is no proposal before the Government to expand the Madras Refineries. However, it is currently increasing its capacity from 5.6 mtpa to 6.5 mtpa. The scheme is likely to be completed within the first quarter of 1992 at a cost of Rs. 119 crores.

ONGC has converted gasoline and diesel vehicles to run them using compressed natural gas (CNG) with the help of imported kits, Mr. Gurupadaswamy told Mr. Bhababu Shankar Hota in a written reply. Some buses of Gujarat State Road Transport Corporation had also been coverted to run on CNG.

Conservation Act

The Government has no proposal to bring a energy conservation Act to bring down the consumption of petrol products in transport, the Minister told Mr. Santosh Kumar Gangwar and Mr. B.N. Reddy in a written reply. A letter of intent has been issued to IPCL for setting up a gas cracker complex with its downstream units at Gandhar in Gujarat, he told Mrs. Basava Rajeshwari.

NEW CHEAPER PETROL SUBSTITUTE

Two young men at Rajkot have claimed to have found an alternative to petrol which is cheaper by 50 per cent and has the capacity to give more than double the average fuel efficiency for two-wheelers. Demonstrating their invention at a press conference, Mr. Ramesh Gajjar, one of the two researchers, told newsmen that it is the liquid formation of a chemical compound available in abundance all over the country. The alternative compound costs about Rs. 5 a litre and can fuel a 100 cc motorcycle to 175 km as against about 70 km in the case of petrol, Mr. Gajjar said. The alternative fuel has been successfully tried on all kinds of twowheelers with wonderful results. A 50 cc moped can go 350 km with just one lite of the wonder liquid, he said.

The new fuel is smokeless and does not create any pollution hazards, he claimed. To use it, minor alterations, costing about Rs. 100 are required in a two-wheeler. To a question, Mr. Gajjar said that he is yet to try his invention on four-wheelers.

A graduate in commerce, the 32-year-old Mr. Ramesh is a motorcycle mechanic, while his co-researcher, Mr. Detas Bhadresa, is only a matriculate and has some knowledge of chemical science. The duo claimed that they have spent more than four years to achieve the success and they want to keep their formula a closely-guarded secret till some big business house or the government recognises their achievement. The new fuel was tested in the presence of journalists at a social service club and two of the reporters had a joy ride on a motorcycle powered by the new fuel.

NEW PUBLICATION FROM CFTRI

The Central Food Technological Research Institute, Mysore has just brought out the revised and enlarged edition of the booklet on ''Home-Scale Processing and Preservation of Fruits & Vegetables''. Aimed at creating an awareness on the application of modern methods of preparing juice/squash/nectar, canning, drying/dehydration and fermentation at home level, the booklet is expected to be very useful for catering/home-science institutions, hotels, small-scale industries, extension workers, cooperative bodies and housewives. The book gives the broad principles of fruit and vegetable preservation and also the general guidelines for preparation of various products including certain specialised items. Usefulness of the book is enhanced by the inclusion of addresses of manufacturers of equipments useful for home-scale processing. (Pages 76 Price Rs. 15/- + Packing & Postage Rs. 8/- by Regd. Book-post). Copies are available from the Sales & Distribution Officer, CFTRI, Mysore-570 013.

Pleas to reconsider petrol use curbs

The Associated Chambers of Com-rce and Industry (Assocham) has ged the Government to reconsider its cently announced measures to curb consumptiom of petroleum products d to take a decision on a case-to-case sis rather than taking it across the ard.

A statement from the chamber said at this was necessary to ensure that the on availability or shortage of oil pro-ucts does not stand in the way of the dustrial sector resulting in a greater utflow of foreign exchange than the mount saved by less import of petrol-um products.

Recognising the need to reduce the mport bill particularly due to the recent purt in oil prices owing to the devel-opments in the Gulf area recently, the hamber urged the industry to avoid all vastage of energy, exercising utmost economy in its use, evolve a fool-proof counting and monitoring system, con-duct energy audits and deploy energy saving equipment and appliances on a arge scale.

The suggestions were contained in a chamber study entitled 'Curbs on consumption of petrol products', which also welcomes the Government's efforts to tap suppies of oil from alternative sources to tide over the crisis.

The study points out that the transport industry is growing in terms of freight, passenger traffic, road length and in number of vehicles. The reduction in the truck load capacity under the Motor Vehicles Act means many more trips requiring more fuel. The 10 per cent cut in the shipping sector will also cause further hardship to the shipping industry and to the exporters.

It said that reduction in the availability of superior kerosene oil (SKO), which is used for the generation of heat for cracking many products, of naphtha — a necessary material for fertiliser and petrochemical plants and furnace oil and LSHS used by cement factories would only result in import of these items leading to a larger outgo of foreign exchange and also lead to a decline in industrial production.

The Government has also placed restrictions on the release of minor products like benzene, hexane and paraffin wax used in various value added export items. If the chemical industry has to achieve its targeted growth, it would increase the supplies of these products. The restricted availability will hinder the country's export effort to a large extent, the study said.

It said the proposed ban on the supply of LPG to new industrial consumers during the current year will lead to slowing down of the industrial activity in the sectors where its use is of considerable economic relevance. According to the chamber, restrictions on the consumption of petroleum products should be looked into from the point of view of their impact on States and industries. The petroleum products supplement energy requirements in the States which have inadequate electricity generation and coal supply. Again, there are processes in the industrial sector which cannot do without supply of oil products.

ESSAR REFINERY PROPOSAL MAY STALL RELIANCE PLAN

Bechtel of the US has joined hands with the Essar group to set up an engineering consultancy firm, which will undertake international plant construction contracts. A memorandum of understanding has been signed by the two to set up the joint venture, in which Bechtel will have a 40 per cent equity stake.

Essar has pulled off a coup by also making Bechtel agree to set two export-oriented projects, one of which is a nine-million-tonne oil refinery at Kodinar in Gujarat. The other is an alumina unit in Orissa. Both are part of th Essar-Bechtel understanding. Bechte will invest in the equity as well as hel raise foreign currency resources for th two projects.

The general impression is that Essa is trying to pull the rug from under Mr Dhirubhai Ambani's feet. Reliance ha placed a six-million-tonne refinery a Jabel Ali in West Asia primarily to cate to petroleum product needs back home

But the government has been sittin on the proposal and the latest developments in the Gulf make it all the mor difficult for it to clear the Reliance project. In the circumstances, it would b inclined to favour the Ruia proposa rather than Ambani's.

Mr. Ravi Ruia, director of the Essa group, said Bechtel was motivated b the desire to make use of the relativel cheap Indian labour which coul sharpen its competitive edge in th international market. Bechtel has foun that higher manpower cost was pricin it out of the market.

Bechtel employs several Indians bu on American wages. By using the join venture, which will offer engineerin services, Bechtel hopes to outbid it conpetitors. Bechtel's business relatio with Essar began when it received th contract for a 100 mw combined cycl power plant at Hazira for the India company's export-oriented hot rolle coil project. Mr. Ruia said the Essar-Bechtel refinery proposal would us Indian labour but the plant would b based on state-of-the -art technolog and get raw materials at internationa prices. Bechtel has undertaken to lift 7 per cent of the production. If the government desires to buy the products instead of importing them, the compan will enjoy a freight advantage. The US company is prepared to invest in similar projects identified by a joint Essar-Bechtel team.

-- Financial Expres

DRAFT PAPER ON POLLUTION

Stiff penalties, audit system proposed

Stiff penalties for polluting industries and introduction of an environmental audit system have been proposed in a draft policy paper awaiting Cabinet approval.

Prepared by the Environment and Forests Ministry, the policy would give higher priority to anticipatory and preventive meaures than to correcting the immediate environmental problems. It seeks to introduce economic instruments to restructure the energy, urban development, tourism, transportation, chemicals, agriculture and particularly small-scale industry sectors through charges.

The policy also seeks 25 per cent reduction in the consumptiom and use of industrial water, as also cleaning of river systems and promotion of environmentally clean technologies during the next five years. It aims at regulating the use of non-biodegradable products, developing a preventive framework for carcinogenic chemicals and bioorganisms and control disposal of hazardous wastes.

An official spokesman said the concept of pollution control would evolve from the present narrow focus of regulatory control of pollution to the management of environment resources. The policy would also impose standards restricting land disposal, surface impoundment, storage in tanks, providing for corrective action as well as financial responsibility.

The policy also provides for assessment of the environmental impact of Government projects and projects receiving State subsidies internally by an environmental cell in the concerned ministry before any decision in principle is made on them.

It also proposes to adopt a code o stewardship with specific goals an operating procedures to strengthen th Centre-State and local co-operation t avoid duplication and increase the effectiveness of efforts. Stringent measure will be provided to regulate industrie which use toxic chemicals and generate hazardous wastes. For effective enforcement, continuous monitorin devices are proposed to be made mandatory for large-scale industrial units.

Mandating public involvement i decision making as a means of promoting dialogue, participation and responsible care, particularly in controversia programmes that involve uncertaintie and judgement, will be done, the policy paper states. The draft policy also provides for creation of a Central pool o environmental experts and managers fo deputation to the States for effective co-ordination and acceleration of environment protection programmes ove the entire country. It also provides fo incorporation of concepts related to pollution in the engineering curricula and managerial training institutions and grants to students in IITs.

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STC NOT TO IMPORT NATURAL RUBBER

The State Trading Corporation o India (STC) will not import any natural rubber for the next six months in orde to ensure remunerative prices to rubber growers in the country, official sources said recently. The directive to STC was issued by the Union Commerce Minsiter, Mr. Arun Nehru, at a review meeting on rubber, they said.

The sources said that Mr. Nehru reiterated the National Front Government's commitment to give remunerative prices to rubber growers in the country and said that all factors would be taken into account while formulating and revising the policy on rubber.

World Bank help in effluent treatment

Under a World Bank-assisted project,' Rs. 30 crore incineration plant and Rs. 1 crore effluent treatment unit ll shortly be set up at the MIDC indu- rial estate in Thane-Belapur for the mmon treatment of hazardous wastes enerated by industries in the area. nother Rs. 10 crore effluent treatment ant is planned for waste generated at e MIDC estate in Dombivli.

According to state environment sec- tary, Mr. U. Mukhopadhyaya, the pre- minary report for the plants in the hane-Belapur area are ready and will e taken up for further discussion at a igh-level meeting with the Central Government and World Bank officials n New Delhi.

Mr. Mukhopadhyaya said the scheme s part of a larger plan for industrial pol- lution management being implemented in four states viz. Maharashtra, Tamil Nadu, Gujarat and U.P. and is being undertaken by the World Bank at the request of the Indian government. The special feature of this scheme is that it envisages the treatment of hazardous wastes under a common system, unlike individual treatment being undertaken so far.

While stressing that a final financial package for the scheme has still to be worked out, Mr. Mukhopadhyaya said the World Bank may pay 50 per cent, 40 per cent will be met by the industries, and the remainder by the state and Central governments. Giving details, Mr. Mukhopadhyaya stated that the areas identified in the state for common treatment schemes were the Thane-Belapur and Dombivli industrial areas as well as the industrial estates at Roha and Badlapur.

The schemes will be implemented with the help of the Maharashtra Pollution Control Board, the Maharashtra Industrial Development Corporation and the state government. He said the Thane-Belapur Industries Association has taken the lead and come forward to support the incineration project.

The association will float a company to run the incineration plant which will be modelled on lines similar to plants already operating in Chicago, Rotterdam and Copenhagen. While the incineration plant will cater to small, medium and large industries, the effluent treatment unit will be built for treatment of wastes from only small units.

According to Dr. S.L. Patil, secretary, Thane-Belapur Industries Association the project cost for the incinerator is Rs. 30 crore, however they have been given assurances by World Bank officials that they could opt for larger projects even up to 70 crores with aid from the bank. The present model for the incineration plant would serve the 1,180 units in the MIDC estate and have a capacity of 150 tonnes of waste slurry a day. The effluent treatment plant will serve the small industries who would have to undertak primary treatment at the plant leve itself.

The idea for common treatment o industrial wastes was first conceived b the Maharashtra Pollution Contro Board several years ago, according t board chairman Mr. C.D. Oommachen

They approached the World Bank fo help and it was only after several year of discussion and survey work that th World Bank finally decided to push th schemes through.

This method of common treatmen will be taken up by the World Bank i other developing countries also. Mr Oomachen said he also had plans t obtain World Bank assistance for th waste treatment plants being put up b the various municipal bodies in the state Regarding the running of the othe plants envisaged in the common treat- ment scheme, Mr. Oomachen said tha

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things have not been finalised. Several questions arise, he said, "Who will run it? Who will ensure the profits? Some plants might be run on a cooperative basis while others might be separate companies''. A final decision would be taken only after all these issues had been resolved, he said.

OZONE LAYER DESTRUCTION 'SPREADING SOUTH'

Destruction of the protective ozone layer in the earth's upper atmosphere will affect the northern hemisphere as far south as the Mediterranesn within the next 10 years, Mr. Joe Farman, the scientist who discovered the Antarctic "ozone hole", warned recently.

Mr. Farmam, an atmospheric scientist with the British Antarctic Survey, predicted that levels of harmful ultraviolet (UV-B) radiation reaching the ground could increase by up to 40 per cent "for short periods" during late winter and early spring, at latitudes as far south as Greece and Turkey.

The most immediate effect would be to expose early season sunbathers to an increased risk of skin cancer. Speaking at the annual meeting of the British Association for the Advancement of Science in Swansea, Wales, Mr. Farman said the Antarctic ozone hole which appeared during the early 1980s was now about as "deep" as it could become during its seasonal appearance in the Antarctic spring. For practical purposes, almost all the ozone over Antarctica was destroyed then.

Ozone is removed from the upper atmosphere by chemical chain reactions started by man-made chlorine and bromine compounds. The main ones responsible are chlorofluoro-carbons (CFCs) used in many products including aerosols, cleaning fluids and foam plastics, and halons used in fire extinguishers.

Now that Antarctic ozone destructio has reached a limit "ozone losses i other regions can be expected t increase rapidly with the growth c chlorine and bromine" in the atmosphere, Mr. Farman said. "The greates effects may not be seen until 2005''.

Chlorine and bromine levels in th lower atmosphere are likely to reach peak around the year 2000 as production of CFCs and halons is phased ou in accordance with the Montreal Protocol. But the chemicals survive so long in the air that their destructive effects will last for many more decades. The Antarctic ozone hole will be around until the year 2070, Mr. Farman predicted.

The outlook for the next 15 years is for the seasonal Arctic ozone hole to become rapidly deeper, he said. The impact will be felt most seriously in North America and Europe where levels of ultraviolet radiation are "about to accelerate" during the late winter and early spring.

To reduce the scale of the problem, Dr. Farman urged governments to phase out ozone-destroying chemicals even faster than they agreed at the Montreal Protocol meeting in London earlier this year. He was particularly concerned about halons — bromine compounds used mainly in fire extinguishers —which have 30 times the ozone-destroying potential of CFCs.

DGS AND D REGISTRATION

Dr. N.K. Sengupta, secretary to the department of supply has announced that in future DGS and D registration of supplying units will be done at the three regional centres, viz., Madras, Calcutta, and Bombay except for units located in the North which will continue to be registered with DGS and D headquarters in New Delhi.

No units from the South will be required to go to Delhi for registration.

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'Energy scenario demands greater attention'

The Energy Minister, Mr. Arif Mohammed Khan, on September 8th warned that the Gulf crisis could precipitate an energy crisis in the country. "Recent developments in the Gulf have projected the energy problem in a sharper focus", Mr. Khan said inaugurating a seminar on "the energy scenario" organised by Financial Express.

As about 45 per cent of the oil requirements are met through imports, the possibility of these imports being affected to some extent cannot be ruled out, he said.

As oil accounts for 24 per cent of the requirements of the country's commercial energy, any distortion in its supply and demand is likely to have serious repercussions on the economy, he said. It is time "we took stock of the overall energy scenario" and the alternatives to be adopted to improve the energy situation.

Since India has friendly relations with the Gulf countries, the Government is making all efforts to minimise the impact of the Gulf crisis, Mr. Khan said.

Although the country produced 220 million tonnes of coal, 34.7 million tonnes of crude oil and 250 billion units of electricity, there is a gap between the demand and availability of energy.

With regard to electricity, he said, the gap is about seven per cent in availability and about 17 per cent in meeting the peak demand.

It is estimated that by the end of 2004-2005, the demand of coal would rise to 450-550 million tonnes and of oil to 95-125 million tonnes and of electricity to 645 billion units.

The fiscal and Physical resource needed to implement such an energ development programme are staggering he said. An astronomical amount o Rs. 4,00,000 crores would be require to develop energy resources to meet thi demand.

Mr. Khan said it would be very difficult, perhaps impossible, to raise resources of this magnitude. A two-pronged strategy, he said, is needed to strike a balance between demand and supply.

Resources would have to be mobilised for increasing energy availability and equal attention should be given to energy management and conservation.

Short-term and long-term measures are needed to tackle the energy problem. In the short-term, more emphasis would have to be laid on renovation and modernisation of existing power plants.

Other measures included completion of projects on time, taking up short gestation gas-based projects, installation of capacitors to improve the quality of power supply and focussing on transmission and distribution programmes.

As a long-term measure, more emphasis could be given to development of hydel power, Mr. Khan said adding, India has vast potential of 84,000 mw of hydel power of which only 14 per cent had been exploited so far. For ideal power management, he said, hydel-thermal mix should be 40 to 60 per cent. Now it is 28 to 72 per cent.

The Minister pointed out that advanced countries, though better off in terms of energy supply, had introduced energy conservation and their products have become competitive in the international market because of reduced costs of energy inputs. India, he said, is still struggling in this regard.

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HDCCI moots easier FERA, MRTP Acts

The PHD Chamber of commerce and dustry (PHDCCI) has suggested nmediate liberalisation of the MRTP nd FERA Acts and an increase in the ivestment limit of MRTP companies, vith a view to allow maximum utilisa- on of their existing capacites. In this ontext, the Chamber President Mr. Kanwar said the need of the hour is to nake the best use of the existing capacties, irrespective of the size of the units. He also suggested that the concept of a dominant undertaking be made realstic and in tune with the present situation. Dominance should be determined n terms of the share of the market and not on the basis of assets, he said.

The Chamber President said that the process of globalisation in the industrial sector has to start immediately lest it might be too late. The mood to share expertise, knowledge and resources are now prevailing strong in the international economy, he felt. The developed countries as well, were ready to vacate many labour intensive industries. Moreover, a fresh spirit of cooperation has emerged in Europe and the Asia-Pacific, he said.

Mr. Kanwar said that the interests and satisfaction of the consumers has to be kept in view while formulating the various aspects of the new industrial policy. This, he said was necessary as the Indian industrial policy is framed primarily from the point of view of encouraging entrepreneurs and not from the point of view of consumers.

To bring about a qualitative transformation in the industrial economy, the Government has to formulate the policy according to the consumers' interests. Issues like the minimum economies of scale, scope for the large houses and items to be reserved for the small scale sector should be decided only after taking into account consumers' welfare Mr. Kanwar stated.

PLASTIC WOVEN SACKS: EC ORDER OPENS UP MARKET FO INDIANS

The European Community (EC) ha slapped a 43.4 per cent provisiona anti-dumping duty on plastic wove sacks of Chinese origin. China is th world's foremost supplier of plasti sacks. Indian exporters have been finding it difficult to compete with Chines material. The EC order dated July 1 makes Chinese bags very expensive an opens up the market to Indian exporters. Next to China, India is the leadin player in the world market. The E order, however, is provisional and i valid for four months.

Given the current raw material scarcity, it remains to be seen whether Indi can take advantage of the situatio unless the punitive levy on Chines bags continues beyond four months.

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INDUSTRIAL PRODUCTION IN 1990-91

10 Pc growth forecast

The industry ministry has forecast a minimum of 10 per cent growth in industrial production for 1990-91 despite the poor investment climate in the first quarter of this year.

This high growth in industrial production is fixed on the basis of the high growth of 13 per cent in the first two months of the present financial year. Incidentally, this growth was on a low base of 2.5 per cent for April-May, 1990.

Also, the industrial growth in the first two months was largely due to the 15.6 per cent growth in the manufacturing sector, over the low base of last year. Manufacturing sector suffered a marginal fall during the same period last year.

According to an official note, if the major constraint of raw materials for the production of iron and steel and non-ferrous metals are removed, a growth rate of over 10 per cent may not be difficult to achieve in 1990-91. This even includes adequate foreign exchange for the import of these critical raw materials.

The forecast for 1990-91 exceeds the growth rates for the past two years. In 1988-89, industrial production grew at the rate of 8.8 per cent and in 1989-90, at 8.4 per cent. The note admits that the investment climate in the economy is rather poor.

The sanctions by financial institutions has fallen by 20 per cent during April-June, 1990, and the disbursals fell by one per cent from the corresponding period last year.

But it explains that the fall was due to the exceptionally high growth in the past two years. The sanctions accorded an increase of 55 per cent in 1988-89 and 10.7 per cent in 1989-90. The disbursals also increased by 33.3 per cent in 1988-89 and 8.7 per cent in 1989-90.

The note points out the poor performance of the infrastructural sector. Six infrastructural industries that account for 30 per cent in the index for industrial production have shown an increase of 5.6 per cent during April-July, 1990, compared with the growth of six per cent during the same period last year. These industries are: electricity, coal, saleable steel, petroleum products, crude petroleum and cement.

Interestingly, the note says that the high growth in exports in the last three years has led to increasing infrastructural bottlenecks. There is lack of adequate warehousing capacity at airports and international cargo capacity is also less than needed.

In addition, there are increasing difficulties in internal movement and facilities for containers. The note gives a break-up of the industrial production in the different sectors. The capital goods industries seem to have improved on their high growth of last year. During April-May, 1990, the capital goods sector showed an increase of 37.6 per cent.

The note explains that the capital goods growth was mainly contributed by the excellent performance of computer systems and its peripherals.

During the first two months of this year, consumer durables grew at the 19.6 per cent growth of consumer durables. The consumer durables grew by a mere two per cent last year. The basic industries grew by six per cent and the intermediate industries at the rate of 6.2 per cent.

DUTY DRAWBACK DISBURSAL NORMS SIMPLIFIED

The Union government has further simplified the regulations governin disbursal of duty drawback to exporter

The government, has dispensed wit the old system of crediting refund c duty drawback cheques to the ban account of shippers. Instead, it woul now give the refund cheques directly t shippers' representatives.

This decision will come into effec from September 15. Exporters had bee demanding an early end to the ol system of refund on the ground that i was causing problem of linking thos refunds to relevant export consignments

The Union government has now permitted manufacturer-exporters to surrender the REP licences earned by them before the last date of expiry of the licences. This particular gesture would no in anyway affect the interest o manufacturer-exporters in respect o their tax liability, according to the government's decision.

In yet another decision, the government has exempted the export trading houses having a five-year unblemished track record from the need to the submit various certificates of chartered accountants in respect of their claims.

Making these announcements at an exporters meeting with senior customs officials recently, Mr. Ramu Deora, president of Federation of Indian Export Organisation (FIEO), said that the government has also assured that all duty drawback claims, if properly supported with documents and submitted at the beginning of every fortnight, would be settled within that fortnight itself.

The commerce ministry has also decided that the export commissioner and senior officials of the offfice of Chief Controller of Imports and Exports (CCI&E) in Delhi would come down to Bombay for three days every month and try to resolve specific policy issues of exporters.

TIONAL R & D

nvestment remains at last year's level

s a fraction of the Gross National duct (GNP), the national research development (R and D) expenditure the year 1987-88, was nearly the ne that of 1988-89, according to the st R and D statistics published by the partment of science and technology ST). In real terms, the amount for ional R and D has increased from . 2,495.87 in 1986-87 to Rs. 2,936.94 1987-88 and to Rs. 3,471.81 crores 1988-89. The GNP fraction for these ars' has been 0.96 per cent, 1.01 per nt and one per cent respectively. The timated R and D expenditure for 89-90 is Rs. 4,003.79 crore and the NP is estimated to have shown a six r cent increase over 1988-89. The 88-89 GNP value is Rs. 3,46,277 ores.

The DST document has drawn atten- on to the point that R and d expen- iture has been increasing faster than the NP. The annual compound rate of rowth of the GNP for the period 986-87 to 1988-89 was 15.7 per cent, hereas the growth of R and D spend- ng for the same period was 17.9 per ent. Out of the total R and D expen- iture for 1988-89, the share of the Cen- ral Government, including the public ector industry, was 82.8 per cent Rs. 2,875.11 crore), that of the private ector was 10.5 per cent and the rest 6.7 per cent was incurred by the state gov- ernments.

Three-fourth of the Central invest- ment on R and D came from major sci- entific agencies like the atomic energy, space, the CSIR, the ICAR etc. The Defence Research and Development Organisation (DRDO) accounted for 27 per cent of the expenditure by the Central R and D agencies. The state sector spent Rs. 232.91 crore for R and D in 1988-89, about 98 per cent of which was on agriculture and allied areas. About 18.4 per cent of the total share of state spending on R and D was by Maharashtra. Viewed differently, the governmental investment — both Central and state — accounted for 79.1 per cent of this expenditure, while the industrial sector — both public and private — spent the rest 20.9 per cent. This share between the institutional and industrial sector has also remained roughly the same over the last two years. The document notes that, this is contrary to what one observes for the developed countries where the industrial sector accounts for more than 50 per cent of the national R and D expenditure.

Industrial investment on R and D in 1988-89 attained a level of Rs. 725.11 crore. This should be compared with Rs. 527.33 crore in 1986-87 and Rs. 598.74 crore in 1987-88. Of the total industrial sector investment 49.8 per cent was by 121 public/joint sector undertaking and the rest 50.2 per cent by 895 private sector in-house R and D units.

About Rs. 129.70 crore of the total investment by the industrial sector was in the group of defence industries. The next highest investment of Rs. 118.03 crore being in the area of electronics and electricals. As percentage of sales turnover the Indian industry, however, the R and D expenditure works out to only 0.72 per cent.

The industrial R and D figures should be compared with the corresponding ones for 1986-87 and 1987-88. The share of public sector in 1986-87 and 1987-88 were 44.7 per cent and 48.2 per cent respectively. The share of the private sector for these two years were 55.3 per cent and 51.8 per cent respectively.

This points to the fact that the share of public sector R and D investment, has been growing. This point emerges even if one analyses the investment figures of a fixed number of in-house R and D units over the period of three years. Though the country's R and D investment is on the increase, having reached a figure of one per cent of the GNP, Internationally our spending on R and D is still on the lower side. Most of the developed countries spend over two per cent of their GNP on R and D while developing countries spend around 0.5 per cent. The per capita R and D expenditure in India is about $ 3 developed countries.

The document makes an interesting observation in relation to the question of productivity of R and D vis-a-vis level of investment in the country. In the absence of clearcut indicators to answer this, the number of applications of patents has been taken as a qualitative parameter indicative of this.

IMPORTS UNDER OGL BY SMALL UNITS

The government has allowed new and proposed units in the small-scale sector to import raw materials, components and consumables under Open Genreal Licence (OGL) subject to certain conditions. These units at the time of customs clearance, will have to produce evidence to the effect that the actual users have furnished a bond with a bank guarantee for a value to 25 per cent of the C.I.F. value of the imported goods.

According to a public notice issued by the chief controller of imports and exports, sub-para (7) of paragraph 62 relating to new and proposed units in the import-export policy (Vol. I) has also been amended to read: " New/proposed units in the small scale sector would be required to furnish at the time of customs clearance a bond and bank guarantee to the extent of 25 per cent of the value of actual imports against a supplementary licence or under OGL. "These units will not be required to furnish bond and bank guarantee if they have gone into production and submit a certificate to this effect from the director of industries concerned."

Company Notes

GLAXO REPORTS HIGHER PROFITABILITY

Glaxo India Ltd., have announced their results for the year ended March 1990. The following are brief highlights of their results.

Financial Performance

Net sales of the company moved up to Rs. 292.04 crores from Rs. 194.99 crores (19 months period). Operating profit (net profit before interest & depreciation) went upto Rs. 34.39 crores from Rs. 22.09 crores. Profitability of the company has shown an upswing. Net Profit before tax has moved up to Rs. 15.22 crores from Rs. 10.02 crores. The company proposed a final dividend of 15% in addition to the interim dividend of 20% declared. Sales of pharmaceutical products have grown at a satisfactory rate. New products introduced during the year included antibiotics and cortiosterioids.

Sales of food products have also shown good growth. The range of products in flexible packs is being gradually increased. The company's joint sector project in UP has started commercial production of edible oils. Sales of veterinary products adversely affected during the previous year has improved significantly.

The company has been legally advised that it is not required to make any payment into the Drugs price Equitation Account in respect of betamethasone prices.

The company has carried forward an amount of Rs. 4.09 crores (net of referred tax credit) against an amount of Rs. 11.12 crores during the previous period.

Exports:

Earnings from exports also went up to Rs. 7.54 crores including Rs. 4.05 crores to rupee trade arrangement from Rs. 5.08 crores (including Rs. 2.41 crores to rupee trade countries) during the previous period.

Imports:

Foreign exchange outflow in respect of imports for raw materials and goods for resale have also gone up substantially.

Research & Development

Clinical studies are on in an advanced oral antibiotic as well as a non sedating antihistamine. Development work to improve the efficiency of the manufactuing process for cephalexin was undertaken. Work on modification of the manufacturing process for betamethasone was carried out.

Association with RRL, Hyderabad for the improvement in technology for manufacture for Vitamin A has been strengthened. Amount spent on R & D has been as under.

Capital Expenditure — Rs. 45 lakhs
Recurring — Rs. 2.63 crores.

The amount represents approximately 1.1% of total turnover.

KHAMBATA TO HEAD GLAXO

Mr. J.S. Khambata will take over as chairman of Glaxo India Ltd. He will succeed Mr. N.M. Wagle, who is to retire after the annual general meeting.

Mr. Khambata, at present, vice-chairman and managing director, has been on Glaxo India's board since October, 1973, and the managing director since Janaury, 1978. Mr. Khambata's team as managing director expires in December 1990. The board has decided to appoint him a 'non retiring whole time director' for five years from January 1, 1991. The board has also decided to vest Mr. H. Dhanrajgir with full executive responsibility for the management of the company for a five-year period with effect from January 1, 1991.

Mr. Dhanrajgir has been the managing director since January 1, 1990. In view of the executive responsibility being vested in him, he will be relieved of his present post of managing director from December 31, 1990.

Four senior vice-presidents of the company are also being inducted into the board. They are Mr. R.P. Bharucha, senior vice-president, family products division, Mr. M.L. Dhar, senior vice-president, primary manufacturing and technical division, Mr. H.P. Khusrokhan, senior vice-president, pharma division, and Mr. A.T. Vaswani, senior vice-president, finance and secretarial division.

While all of them are being inducted as whole-time directors, Mr. Bharucha, Mr. Khusrokhan and Mr. Vaswani are being inducted as alternate directors. Mr. Bharucha will be alternate director for Mr. M.S. Stone, Mr. Khusrokhan for Mr. N. Maidment and Mr. Vaswani for Mr. J.D. Commbe. At least four foreign directors quit the board during the current year. They are Mr. H. McCorquodale, Mr. H.M. Samlley, Mr. G.J. Balker and Mr. W.I. Glynna Williams. They were replaced by Mr. Stone, general counsel and director of Glaxo Far East (Pvt) Ltd., Mr. Maidment, a director on several Glaxo enterprises in China and Hong Kong, Mr. A.M. Pappas, executive director of Glaxo Holdings Plc., UK, and Mr. T. Thomas, former chairman of Hindustan Lever.

UB PETRO'S RECORD BUSINESS

UB Petroproducts Ltd. has registered a record sale of 200 tonnes of products in just 14 days from August 17 to 31.

The plant, a Rs. 81-crore joint venture of the UB group with Tamil Nadu Industrial Development Corporation was formerly inaugurated on August 12.

The company has secured its first port order for 10 tonnes of polyol m Nepal and is negotiating with other untries. It intends to ensure ready ailability of international quality sub- tution chemicals in quantities suffi- ent to meet the all India demand. The mpany estimates that this will enable e Government to save nearly Rs. 50 ores in foreign exchange.

Amongst the immediate plans for the ture is a proposal to undertake pro- iction of 14 different grades of poi- ols required for the manufacture of ackaging application, wood substitute ticles, polyurethane elastomer manu- icture of automobile components etc.

The company has also been negoti- ting with the Government for bringing DI (toluene di-isocyanate) under tock and sale' category of imports for asy availability to foamers, who are in e small scale industry sector. In addi- on, providing sufficient quantities of ropylene oxide would give a boost to everal other petrochemical manufac- urers.

VANAVIL DYES AND CHEMICALS: POISED FOR GROWTH

Vanavil Dyes and Chemicals Lim- ted, which became a subsidiary of Colour-Chem Ltd., on May 7, 1990 is poised for a phase of consolidation and growth — having come back in the last couple of years from the verge of turn- ng into a sick unit. More importantly, Vanavil is fast emerging as a big exporter of dye intermediates and is expected to become a sourcing point for the requirements of Colour-Chem's collaborators and associates abroad such as Hoechst AG of Germany.

All this is of course, subject to the induction of additional resources by Colour Chem, expansion of present capacities and more importantly the injection of at least a couple of crores of rupees by the parent company for upgrading pollution control facilities and disposal of effluents. Colour-Chem became a joint promoter of Vanavil along with the Tamil Nadu Industrial Development Corporation (TIDCO) when the original private sector promoter backed out of the project. The attraction was that Vanavil had a licence to manufacture Napthols, a critical raw material for Colour-Chem's pigment production which was in short supply and had just then been reserved for the small sector.

The company went public in 1984, with a 26 per cent stake by TIDCO, 25 per cent by Colour-Chem and an offer of 8.81 lakhs shares to the public. Colour-Chem intended to treat Vanavil as an ancillary unit supplying fast colour bases, Naphthols and to manufacture some ad hoc products as per the company's requirement.

In the latest year ended March 31, 1990 — Vanavil's sales turnover rose 70 per cent on an annualised basis to Rs. 1,733.54 lakhs and pre-tax profit amounted to Rs. 82.60 lakhs — 234 per cent increase on an annualised basis over the previous year.

Carryforward losses were wiped out to the extent of Rs. 61.75 lakhs and the balance loss of Rs. 19.68 lakhs could also have been cleared but for the provision of Rs. 36.88 lakhs for investment allowance reserve. An increase in trading income also contributed to the jump revenue — since the parent company, Colour-Chem decided to use the marketing base set up by Vanavil to market its own products in the South. As a result trading income increased from Rs. 24 lakhs in 1989 to Rs. 63.96 lakhs in the latest year.

According to the chairman Mr. K.R.V. Subrahmanian, the current year should show another 25 per cent increase in turnover with consequent improvement in profitability. There is unlikely to be a tax liability during the year, which means that Vanavil would be in a position to announce its maiden dividend. However the most important change has been on the export front. The chairman states in his speech that the company will now have access to new export outlets apart from latest technical know-how available with Hoechst AG.

Exports to Hoechst AG as well as other countries have already picked up — in the latest year the company has announced a direct export earning of Rs. 61.82 lakhs it had also sold a dye intermediate through an export house worth Rs. 146.86 lakhs. Vanavil exported Chloroanilines to Hoechst AG and some dye intermediates during the year.

Mr. Subrahmanian, however, cautions that there will be no dramatic increase in exports unless the environmental standards in Cuddalore are upgraded to pass the audit of Hoechst AG — only then will additional capacities be added which will enhance exports.

While Vanavil plans to invest around Rs. 2 crore in environmental measures over the next couple of years — it would require a lot of help from the state government or rather the SIPCOT Industrial Complex at Cuddalore. One of the major problems in the area is lack of proper marine outfall into the sea for disposal of treated effluents. In fact, the company at present allows its treated effluents to flow on to its own land and depends on solar heat to dispose them.

Since Colour-Chem's collaborator is unlikely to part with any technology for additional capacity at Vanavil unless environmental problems are sorted out — all further growth particularly for exports would depend on action by SIPCOT. That is not to say that growth will come to a standstill — in fact the stock markets have already reacted to the changes at Vanavil — particularly the mutual funds and the share shot up from around Rs. 30 to touch Rs. 50 in last few weeks.

DIAMINES & CHEMICALS

Diamines and Chemicals has hiked the dividend to the record level of 22 per cent for the year ended March 1990 from 15 per cent paid last year.

It has produced better results. The gross profit is up to Rs. 196.49 lakhs from Rs. 155.15 lakhs following a rise in gross sales to Rs. 16.89 crores from Rs. 10.96 crores in the previous year. The net profit has shot up to Rs. 76.31 lakhs from Rs. 34.30 lakhs after depreciation (Rs. 106.18 lakhs against Rs. 64.69 lakhs) and taxation Rs. 14 lakhs against Rs. 4.82 lakhs. The disposable profit is Rs. 82.98 lakhs compared to Rs. 38.69 lakhs.

The dividend pay-out is Rs. 40.66 lakhs against Rs. 27.72 lakhs. It has allocated Rs. eight lakhs against Rs. 4.30 lakhs to the general reserve. The balance Rs. 34.42 lakhs against Rs. 6.67 lakhs is being carried forward.

It has exported 255 tonnes of ethyleneamines worth Rs. 118.62 lakhs. Last year export was 120 tonnes. The company has completed implementation of phase-II of modernisation-cum-expansion by which it has now been possible to reach production level of 2,100 tonnes a year against the licensed capacity of 2,000 tonnes. It has also completed its piperazine plant with entire indigenous technology and considering the installed capacity of 150 tonnes a year of piperazine plant, the total installed capacity achieved comes to 2,250 tonnes yearly.

It has already obtained a letter of intent for enhancement of production capacity of ethyleneamines to 5,000 tonnes from 2,000 tonnes and industrial licence for the manufacture of 300 tonnes of piperazine.

The management intends to achieve these capacities at the existing plant site in a phased manner to meet the increased market needs.

PFIZER

The performance of Pfizer during the first four months of the current year is encouraging. It has recorded a growth of around 30 per cent in sales over the corresponding period last year, according to Mr. S.V. Pillai, Chairman of the company.

Addressing shareholders at the company's annual general meeting at Bombay, he cautioned that it was difficult to predict the situation in the coming months, in the context of frequent official statements on DPCO and other industry matters, and concerned about the inflationary trends affecting the industry.

He said that Piroxicam, a major antiarthritic drug, discovered and developed by Pfizer was launched in India under the brand name 'Dolonex'. The company continued to enjoy leading market shares for many of its products. Same in the case of its range of animal health products also.

The company was in the process of introducing a product called 'Distodin', an effective therapy for the treatment of liver fluke worms in cattle, and also examining the possibility of introducing some of the hospital products in the Pfizer range, available in USA and other countries.

On the manufacturing front, productivity levels at all the plants were encouraging and had been able to overcome many of the earlier constraints. The luphoric drugs plant at Ankleshwar was being modernised and expanded, and when complete, this would become an important addition to its manufacturing facilities, he added.

IPCL DECLARES Rs. 18.6 CRORES DIVIDEND

Indian Petrochemicals Corporation Ltd., (IPCL) a government of Indi undertaking, has declared a dividend o Rs. 18.6 crores on its paid up share cap ital of Rs. 186 crores, for the yea ending 31st March 1990. This is th sixth year in a row that IPCL ha declared a dividend of Rs. 18.6 crore each year. This decision was taken i IPCL's twenty first annual genera meeting held in Baroda on August 27 1990. IPCL had a rewarding year, 31s March 1990, posting a sales turnover o Rs. 1,179 crores, representing a 14% increase over that of the previous year earning a gross profit of Rs. 217 crore and net profit of Rs. 96 crores. IPCI also reduced its specific energy consumption by 7% over that in the previous year. During 1989-90 IPCL's Rs. 1390 crore Maharashtra Ga Cracker Complex at Nagothane wa mechanically completed. IPCL receive a letter of intent from the Governmen of India for setting up a Rs. 2,665 cror integrated gas based petrochemica complex at Gandhar in Gujarat. A significant initiative by IPCL was in terms of crystallisation of a joint venture with M/s General Electric Plastics, B.V., the Netherlands to manufacture advance engineering plastics in India.

During 1989-90, IPCL issued a largest commercial paper, worth Rs. 30 crores, which was accorded the highest rating of P1+ by The Credit Rating and Information Services India Ltd. IPCL also successfully commercialised an indigenous monometallic reforming catalyst for aromatics productions and a new generation encillite catalyst for xylenes isomerisation. A bi-metallic catalyst for naphtha reforming has been produced and is being commercialised.

IPCL received two prestigious awards 1989-90 — The 1989 FICCI award for environmental preservation and pollution control and the International Award of Honour from The National Safety Council, USA for its safety performance. This safety award was conferred on IPCL for the ninth time and for the sixth consecutive year.

Shalimar Paints unit at Nashik

Shalimar Paints Ltd., will be setting a second paint unit at Nashik in aharashtra. Production at the unit is pected to begin next year. Though the tual product mix is yet to be decided, e unit will concentrate on decorative ints to strengthen the company's esence in that sector of the market.

The estimated investment in the pro-ct will be in the region of Rs. five to x crores, Mr. R. Jindal, director Shal-mar Paints, told newsmen after the con-lusion of the company's annual general eeting held at Calcutta recently. inancing proposals for setting up the roject would be submitted to the finan-ial institutions shortly.

The company declared a dividend of en per cent for the financial year ended March 31, 1990. Sales at Rs. 71.62 crores was approximtely 19 per cent higher over the 1988-89 figures on annualised basis. Actual sales in the 15-month accounting period ended March 31, 1989, stood at Rs. 75.15 crores. Profit before tax for 1989-90 stood at Rs. 81.84 lakhs (Rs. 2.09 crores) while profit after tax stood at Rs. 72.74 lakhs (Rs. 2.09 crores).

Land has already been purchased for the Nashik unit. As of now, the plant will be using technology supplied by Salkie of Italy, though other sources of technology may be tapped in future. The unit may be set up in two phases and will make resins, emulsions and other paint additives besides paints. At a future date, production of powder coating paints may be taken up, Mr. M.M. Sabharwal, the company's chairman added.

Nashik has been selected as the site as it is close to sources of raw material and also the the Western Indian market which the company wishes to tap in the years to come. At present, the company's products are being transported from Eastern India to markets in the Western part of the country. Meanwhile, the sale of company's equity held by Courtaulds Coatings Ltd., UK, (formerly International Paints PLC) to the NRI Jhunjhunwala group of Hongkong was yet to receive Reserve Bank and government clearance but this was merely a procedural delay, Mr. Sabharwal said. Certain queries had been raised about the purchase but the replies had been forwarded some time back. There were no more pending queries nor have any fresh queries been raised.

Commenting on the aquistion of the Shalimar stake, Mr. S.Jhunjhunwala, who was present at the meeting, said this was the first major purchase by his group in the country. The fate of the Shalimar venture would be decided by future investments by his group in the country, he said. Mr. Jhunjhunwala has been a NRI for over four decades.

For the present, industrial coatings will continue to be the major area of operation for the company. An arrangement with Courtaulds for the latest technology in this field was under way. Courtaulds Coatings was at present concentrating on marine and powder coating paints and was expected to continue as a tehnology source in the future in these fields.

On the technology front, the company was engaged at present in developing coil coatings, powder coatings and high solid, including water thinnable, coatings.

BERGER SHAREHOLDERS TO GET ALLOTMENT IN UB ELASTOMAS

Shareholders of Berger Paints India Ltd will get preferential allotment of shares of UB Elastomas being set up by the UB group of Vizag at an estimated cost of Rs. 400 crores.

Giving this information at the annual general meeting of Berger Paints at Calcutta Mr. Vijay Mallya, the chairman of the company said the paint company would be one of the several companies of the UB group which, together with the foreign co-promoter, Presindustria of Italy, would be holding 40 per cent stake in the Vizag-based company having an equity capital of Rs. 110 crores. Berger Paints would contribute to the extent of Rs. one crore in the equity of UB Elastomas, Mr. Mallya said.

Later, he told newsmen that UB Elastomas was likely to go into production in 1992. "Land has been acquired, technical fees provided, design package received, financial sources tied up and orders have been placed for the import of equipment", he said.

In Berger Paints, the priority would be to produce more of value-added items like powder coatings, cathodic electrode coats and heavy duty coatings, he said. " There is so much of competition in the decorative paint business and the market for marine paint limited", he added.

Berger Paints chairman said the results of the company's R and D effort would soon start flowing out to foreign countries as J N Holdings, Plc, UK, had decided to make use of R and D of the Indian subsidiary.

Mr. Mallya who praised the R and D division of the Indian company observed, "we have got excellent people in the company's R and D division and we propose to enhance its strength further by concentrating more on application and formulation results". The development of technology for titanium dioxide was to receive top priority.

"In India, there is a monopoly producer of titanium dioxide in Kerala but its production capacity is limited and technology outdated". He said. "At the international level, the technology is closely guarded by a handful of firms in USA, Japan and Europe and they will not part with their technology".

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Ministry okays new IISCO revamp plan

The Union steel ministry has pproved the revised revamp programme of IISCO. Official sources say hat the department of steel would hortly send all the relevant papers concerning the IISCO project to the Public Investment Board (PIB) for clearance.

The sources are confident that both the PIB and the cabinet committee on economic affairs approval for the project would be obtained within the next three months. The ministry has accepted the revised IISCO modernisation programme, as submitted by the Steel Authority of India Limited (SAIL), without any major modifications or alterations.

Mr. Dinesh Goswami, Union steel and mines minister, had reportedly cleared the scheme recently before he left for Assam with some other ministers to attend the North-Eastern Council meeting. Thus, the first major hurdle to IISCO's modernisation has been crossed. The proposal has been hanging fire for the last 15 years, during which several Indian and foreign consultants had been engaged to prepare a feasibility report for modernisation of the 70-year-old steel plant. The earlier feasibility and project reports had all been rejected.

The IISCO modernisation will be based on a project report, prepared by a group of Japanese steel consultants, headed by Nippon Steel, and modified by M.N. Dastur and Company and SAIL's projects division.

However, the original Japanese proposal concerning the plant, capacity expansion, product-mix, financing norms and the implementation method have been totally rejected.

The Japanese had recommended a break-and-rebuild programme for IISCO, raising its capacity to 2.15 million tonnes, on a turn-key basis, with an investment of about Rs. 6,800 crore. The revised Indian Iron modernisation proposal, as approved by the steel ministry, envisages a production capacity if 1.8 million tonnes, requiring an investment of around Rs. 5,000 crore, foreign exchange involvement being about 20 per cent of the project cost. However, the final say on project cost rests with the PIB.

The sources say that the change in IISCO's product-mix under the revised programme 'will bring a very attractive return on investment in the neighbourhood of 10 per cent.

The project will not be implemented on a turn-key basis and the foreign technology will be obtained through global tenders. SAIL will strive to ensure that the project does not suffer from time or cost overrun.

IRON, STEEL EXPORTS UNDER OGL

To bail itself out from the foreign exchange crisis, the Government has allowed export of iron and steel under open general licence (OGL). A public notice No. 43-ETC (PN)/90 dated August 24, was issued at New Delhi on August 31. However, cast iron prices and fittings namely, steel produced by integrated steel plants, alloy steel plants, mini steel plants, secondary producers and re-rollers would not be allowed to be exported, the notice added.

The exporters would have to submit a "no objection certificate' (NOC) from the Development Commissioner for Iron and Steel, Calcutta, before exporting. A maximum limit of 10% of the total production has also been prescribed. The necessary export trade control (ETC) has also been issued. In a separate public notice No. 42-ETN(PN)/90 dated August 24, the Government has also allowed export of decorative grass and non-edible grass other than fodder grass on production of NOC from the Chief Conservator of Forest, Deputy-Director Wild Life Preservation, or any other designated officer of the Ministry of Forest, Environment and Wild Life.

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FAL-G an alternative to Portland cement

An obsession with putting solid waste to good use has resulted in the formulation of a low-cost technology that could revolutionise the building industry by cutting costs by half. The wonder product is FAL-G which uses flyash, the waste material generated in lakhs every year by thermal power stations, to replace the costly Portland cement in the production of precast construction items like concrete blocks.

It is the outcome of two years of research by an entrepreneur couple from Visakhapatnam who have succeeded in getting FAL-G concrete blocks and roofing blocks used in low-cost housing in the region.

Mrs. N. Bhanumathidas, who along with her husband, Mr. N. Kalidas has formulated the Bhanu flyash technology, hopes that in two years it would spread across the country to usher in a housing revolution. She told the *Economic Times* that HUDCO which had sponsored a seminar in July on the use of flyash technology, was ready to promote their process.

Mrs. Bhanumathidas claims studies have proved that FAL-G concrete can be developed with strengths equivalent to that of Portland cement concrete at about 50 per cent of the costs. Further research is underway to determine the corrosiveness of this product on reinforced steel before promoting its use in RCC.

Three factors make FAL-G an extremely attractive alternative to Porland cement. Flyash is available in plenty with the annual generation by thermal stations estimated at 300 lakh tonnes. By the turn of the century, it is expected to treble to 900 lakh tonnes. All this is exclusive of accumulations which are said to be massive.

Secondly, the process used is extremely simple. No sintering or autoclaving is required as simple water spray curing is sufficient. Early gain of strength in the material which uses 70 per cent flyash and 15 per cent each of calcined gypsum and lime allows despatch of the blocks from the fourth of the seventh day of casting.

The biggest selling point of the technology is that an outlay of just Rs. 2 lakhs is needed on plant and machinery for an output of 3,000 cubic metres. As Mrs. Bhanumathidas explains, over the years any number of processes have been explored for utilising flyash effectively but no approach could provide a satisfactory solution to use the waste material in large quantities.

Although some technologies have promoted the use of flyash in conjunction with cement and clay, the processes have proved to be too costly, calling for an investment between 20 lakhs and Rs. 50 lakhs for producing 3,000 cubic metres.

This is the first time a low-cost technology for using flyash has been formulated in the country, claims Mrs. Bhanumathidas who has dedicated it to the nation, to ensure rapid and widespread propagation. Immediate applications of the technology are in the cottage industry which can use it to make plant pots, ventilator blocks, staircase stumps and ornamentation for boundary walls.

It is however, the next step that holds greater promise for revolutionising the construction sector. This is to produce FAL-G cement which could be bagged and sold anywhere in the country. A different process would be required for making the cement and Mrs. Bhanumathidas is planning to set up a pilot plant with technical assistance from Salzgitter Industriebau of West Germany to demonstrate its feasibility.

Factories of one lakh to ten-lakh tonne capacities are the only solution to dispose the huge flyash accumulation in the country, points the entrepreneur whose consultancy firm Bhanu International has a tie-up with the German company. The main consideration in setting up plants to make FAL-G cement would not be just the environmental question. As with other commercial ventures, it would primarily be based on costs — FAL-G cement would cost only Rs. 500 per tonne against Rs. 300 to Rs. 400 more for Portland.

Ours is a technology which has implications for the ministries of energy, environment and housing and urban development, points out the researcher who is working on several other waste utilisation projects. What is required is a clearcut policy on flyash that would promote its proper use.

This should cover free supply of flyash from thermal power plants to such projects, allocation of land in their vicinity and adequate funding from the financial institutions on a priority basis and subsidy from either HUDCO or the urban development ministry for plant and machinery used in flyash projects.

If a serious attempt is made to provide some incentives, says Mrs. Bhanumathidas, we could be witnessing a stupendous change: a clean-up of the environment, a pollution-free low-cost industry that would help conserve energy and provide cheaper housing for the country's homeless millions.

GNL TO MERGE WITH GSFC

Gujarat Nylons Ltd. (GNL) proposes to merge with Gujarat State Fertilisers Company (GSFC) effective from April 1, 1990, subject to necessary clearance. As per the merger scheme GSFC will offer one equity share of Rs. 10 each for every eight equity shares of Rs. 10 each of GNL.

The shareholders of GNL will be eligible for the dividend to be declared by GSFC for the current year ending March, 1991 and also they are entitled to the bonus issue of three-for-ten.

Steel policy may be relaxed further

The Department of Steel is thinking of liberalising the steel policy further. A plan has been submitted to initially allow greenfield projects to be set up by the private sector. The next phase will be to completely delicense this sector. The Ministry seems to be in favour of complete freedom to those wishing to enter steel making. The proposal is expected to be put before the Cabinet for approval soon.

The new thinking comes weeks after the Government has already liberalised its 1988 policy. In June this year, the minimum economies of scale were fixed at 2.5 lakh tonnes per annum. Within a month, this was increased to one million tpa. All of a sudden, the Ministry wants to open all doors to the private sector.

The compulsions for such a change seem to be the lack of real interest by the private sector. No new proposals have been received by the Ministry after the new policy was announced. Only the earlier ones are pending. For example, the new policy allows steel units to be set up using the blast furnace (BF) route. Only the Jindals and Mittals have evinced interest in such complexes. The Mukands have talked about it but have not approached the Government. Even these proposals will have to be cleared at the political level.

This is because the policy does not allow any greenfield projects to be set up in the country. In the case of Jindals and Mittals, the respective State Governments are backing the proposals for clearance but it will take time. For other routes (like sponge iron or mini-blast furnace) there has been a lot of hype. No concrete plans have been submitted to the Government. Some of them, like the one submitted by the Ambanis in 1988, have lapsed but the entrepreneurs have made no attempt to rejuvenate it.

Another compulsion has been the lobbying by various parties. TISCO, for a long time, has been serious about putting up a complex at a new site. With competition now knocking at its doors, it has become imperative for it to expand and set up new units. But it cannot do so under the new policy.

Both Viren Shah and the Mittals alongwith the Jindals have been trying hard to convince the Government to make it free for all. The Government, in addition, is sitting tight on proposals given by 32 parties in response to the Government's wish about a year ago.

No decision has been taken on these which include setting up of steel capacities between 1.5 lakh tpa and 2.5 lakh tpa. Many of these include favoured States' industrial corporations like West Bengal, Orissa, Delhi. Most of these ar also greenfield projects. The Department thinks that if other projects ar cleared under the ne policy, it will be unfair to those wh have been waiting for long to get thei projects cleared.

SICOM RAISES LOAN LIMIT T Rs. 150 LAKHS

On account of the recent revisio made by the Industrial Developmen Bank of India (IDBI) in its Refinanc Scheme, the State Industrial an Investment Corporation of Maharashtr (SICOM) is now in a position t advance term loans up to Rs. 150 lakh to a single industrial project with a investment up to Rs. 5 crores. Earlier the limits under this scheme wer Rs. 90 lakhs for term loans and Rs. crores for project cost.

'A' STATUS FOR HINDUSTAN ZINC

The public sector enterprise in th Union Department of Mines, Hindusta Zinc Ltd. (HZL), has been accorde schedule 'A' status by the Governmen of India. The Government has als appointed Mr. A.C. Wadhawan, a eminent metallurgist and a recipient o the Bralco Gold Medal from the India Institute of Metals, as Chairman Managing Director.

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SM Dyechem to set up carbon black project

SM Dyechem Ltd. is setting up a Rs. 90 crore carbon black project in the joint sector with the participation of the Karnataka State Industrial Development Corporation (KSIDC) and the South Korean Corporation, Lucky Goldstar. The project, to be set up at Mangalore in Karnataka, envisages a 20 per cent equity participation from the South Korean company. KSIDC and the promoter, SM Dyechem, pick up 10 per cent and 40 per cent, respectively, while the rest is to be offered to the public.

Apart from equity participation, Lucky Goldstar will transfer state-of-the-art technology for the project with an installed capacity of 50,000 t.p.a. of carbon black. KSIDC is participating in the venture because the original letter of intent for the project was issued in its name. The project, for which other details are still being worked out, is expected to take off commercially in the second half of 1993. With the South Korean company committing to buy back over 40 per cent of the total production of the new company, the promoters do not foresee any marketing constraints.

Even otherwise, the new company should have no marketing problems with the National Front government having delicensed automotive tyre production to draw new entrepreneurs. Though the government move has yet to attract investment from new entrepreneurs, it has at least helped the existing tyre manufacturers to increase capacity by a million tyres. This, in turn, has raised the demand for carbon black.

Meanwhile, SM Dyechem has got all the clearances, except that from the controller of capital issues, for its Rs. 275 crore monoethylene glycol project at Pune. The CCI okay is expected shortly, according to its chairman, Mr. S.M. Shetty. It has also received SIA registration for the production of methanol at Machilipatnam in Andhra Pradesh with an installed capacity of 300,000 tonnes. For this, the company has also obtained ONGC's consent for supply of the required quantity of gas. That apart, according to Mr. Shetty, it has secured SIA registration for the production of 5,60,000 tonnes of pig iron near Pune.

According to the working results of the company for the year ended March 31, turnover has grown by 143 per cent on an annualised basis, from Rs. 25.79 crores in the 18-month period of 1987-89 to Rs. 41.97 crores in 1989-90. Its gross profit, during this accounting period, had gone up by 192 per cent, from Rs. 2.3 crores to Rs. 4.48 crores. Consequently, the board increased dividend from 24 to 30 per cent.

The company has begun to export some of its fast food items, and is, at the same time, exploring markets abroad for its speciality chemicals for leather, pesticides and man-made fibre industries.

INPUT SHORTAGE MAY LEAD TO ALUMINIUM IMPORTS

India which has been exporting aluninium for the past two years, may be forced to import this metal if the current shortage of raw petroleum coke caused by the reduced import of this item by Indian Oil Corporation continues.

Raw petroleum coke is used for making calcined petroleum coke to manufacture alumina from which aluminium is produced.

The reduction in the import of raw petroleum coke follows the government's decision to cut down the exchange allocation for importing this item by IOC due to the country's difficult balance of payment position. The shortage of raw petroleum coke will be more pronounced after the present stocks with aluminium products are exhausted in the next few days.

The Union Mines Department has taken up with the Finance Ministry the question of restoring the cut in the exchange allocation to IOC which is only about Rs. 20 crores so that there is an uninterrupted supply of raw petroleum coke to the aluminium industry and imports are not resorted to leading to a huge exchange outflow.

There were no aluminium imports by Minerals and Metals Trading Corporation during 1988-89 and 1989-90 due to increased availability of the metal from the National Aluminium Company Ltd. (NALCO). However, imports were allowed under open general licence but this facility was withdrawn subsequently.

The shortage of raw petroleum coke comes at a time when a marginal fall in aluminium production is anticipated by NALCO due to an accident in May which forced a shut down of one of the units of its captive power station and the problem of recommissioning all the potlines in the smelter. Added to that was the recent cyclone in Andhra Pradesh which affected the movement of raw material. NALCO's total production during 1990-91 is now projected at about 1.50 lakh tonnes against the target of 1.80 lakh tonnes.

The company earned Rs. 409 crores in foreign exchange by exporting 4.49 lakh tonnes of alumina and 27,000 tonnes of aluminium in 1989-90. Meanwhile, the aluminium industry's proposal for expansion of its smelting capacity during the eighth plan is under consideration of the government. NALCO has proposed an expansion by 1.15 lakh tonnes, while Hindal and Balco have together planned an expansion by 3.15 lakh tonnes.

Of these Balco's expansion is virtually dependent on tying up new sources of supply of bauxite because of the uncertainty about developing the Gandharmardan project in Orissa due to local agitation.

TISCO to export output of Indian Charge Chrome

TISCO has entered into an agreement ith the Orissa-based Indian Charge hrome Ltd. (ICCL) for exporting its ntire production. ICCL, promoted by ndian Metals and Ferro Alloys (IMFA) n 1982, was set up as a 100 per cent xport-oriented unit to manufacture high arbon ferro chrome at Chowduar, an ndustrial growth centre located between Bhubaneshwar and Cuttack.

Under the arrangement, TISCO will upply raw material to the company rom its iron ore mines at Sukinda in Orissa. TISCO has taken on lease from he state government almost 90-95 per cent of the mines there and is in a position to supply raw material to ICCL at a low cost to make the finished product competitive in the global market.

The agreement also says that TISCO will undertake to export ICCL's entire production. The announcement suits both the companies admirably as ICCL will be able to manufacture at a low cost and face no marketing difficulty, and TISCO will be able to increase its exports. TISCO, it may be recalled, has decided to increase exports to about Rs. 500 crores by 1994-95.

TISCO has been considering the possibility of exporting ferrochrome for sometime. The product was in great demand in international market even a year ago, fetching attractive prices. But, of late, it has been witnessing sharp fluctuations in prices. The price per kg has seen variations between 45 cents and 90 cents, putting Indian exporters in severe difficulties.

TISCO has appealed to the Union Govt. to consider extending some kind of assistance like cash compensatory support to enable exporters to sell overseas at times when the price plunges. It has suggested that such supports could be given only when they are needed and withdrawn as world prices firm up.

The export outlook is not so bright at the moment with international prices ruling at low levels. However, following this new arrangement with ICCL, it should be possible for TISCO to undertake exports, which ICCL, on its own, would not be able to do. ICCL, which has the capacity to manufacture 50,000 tonnes of ferrochrome a year, has commended commercial production at 30 per cent capacity utilisation.

ICCL has financial and technical collaboration agreement with Elkem A/S of Norway for the manufacture of ferrochrome with major equipment supplies coming from a consortium of Swedish firms, namely, ABB Steel AB, Gotaverken Energy AB and AB-Electro Invest. It is also responsible for erection of plant and training of company personnel.

POLICY SUPPORT SOUGHT FOR SOUTHERN MINERAL EXPORTERS

South India will be able to export large quantities of processed minerals and granite, if certain policy changes are initiated to encourage private efforts. This was emphasised at the southern regional conference of the Chemicals and Allied Products Export Promotion Council at Madras on August 31.

While Mr. N.B. Patel, national chairman of the council, commended the southern region for contributing towards improvement in the performance of exporters under the council. The regional chairman, Mr. S. Vedam, said that the large reserves of iron ore, barytes, quartz, feldspar and granite in the region could not be exploited fully for policy shortcomings.

Mr. Vedam was particularly critical about frequent changes in leasing policies in many states, non-renewal of existing leases and dishonouring commitments given to industry on leases and renewals. He also cited lack of standardisation of royalties and dead rents, stringent transport rules, preventing transport of rough blocks weighing over 10 tonnes, prohibition on inter-state movement of granite blocks, insistence on setting up granite factories in every state, even for small quarries, and denial of tax benefits under section 80 HHC as the other constraints.

South India could improve on its record of contributing 60 per cent of the country's plywood exports if permits were issued more freely for export of sawn timber from exclusively imported wood with a value addition of 25 per cent. Mr. N.B. Patel noted that exports under the council had recorded a 55 and 40 per cent increase in 1988-89 and 1989-90 respectively, against the overall export growth rates of 28 and 26 per cent for the two corresponding years. In fact, the targets for 1988-89 and 1989-90 have been exceeded by 30 per cent and 10 per cent, respectively.

South India's share was Rs. 270.7 crore in the national figure of Rs. 1,028.05 crores in 1987-88, Rs. 371.8 crores in Rs. 1,594.7 crores in the following year, and Rs. 459.4 crores in Rs. 2,228.7 crores in 1989-90. The region is expected to increase its contribution by another 24 per cent to Rs. 570 crores in the current year.

Welcoming the long-term exim policy, Mr. Patel emphasised the need for deliberate efforts to create exportable surplus and aggressive marketing. Exploitation of developed and third world markets has so far not been sufficiently innovative, he said suggesting collective publicity campaigns.

Mr. Patel felt the real hurdle to promoting exports was the nagging problem of delay and differing perceptions of various government departments regarding export policy and assistance. The conference was inaugurated by Mr. S.S. Barnala, Governor of Tamil Nadu.

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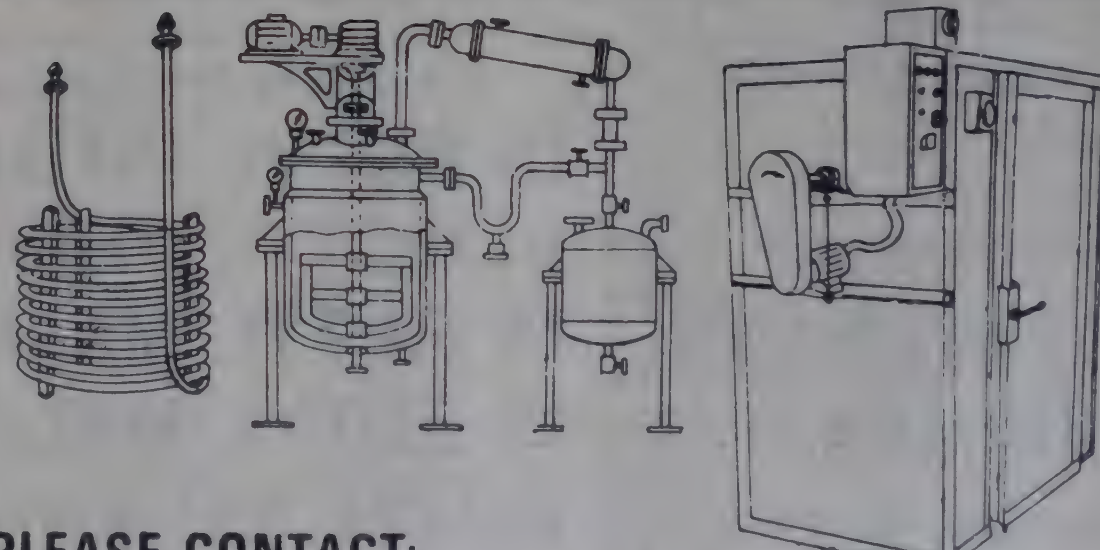

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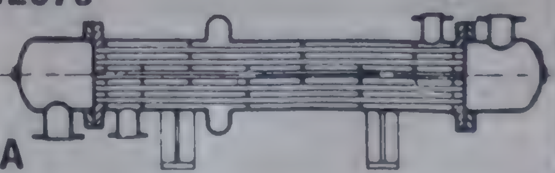

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SPOTLIGHT ON

Biotechnology & Life Sciences (Part 2)

DU PONT OUTLINES GENE NSERT BREAKTHROUGH

Researchers at Du Pont and Duke University (North Carolina) have ecently demonstrated a method of nserting genes directly into the DNA of specific animal cells by achieving genetic transformation in the skin and liver cells of live mice. The development offers the potential to treat genetic disorders.

The research teams employed a particle delivery system, Biolystic, developed by Du Pont to insert genes encoding the protein luciferase into the DNA of selected tissues. The animal's biosynthetic systems produced this protein, which does not naturally occur in mice.

Luciferase is an enzyme that occurs in fireflies and causes them to glow at night. This property allowed the researchers to verify their work easily. Traditionally, to create a transgenie animal, cells are removed and transfected with foreign DNA, cultured and reintroduced into the animal. Genetically modified retroviruses are usually employed from transfection because they introduce their DNA into that of the cell.

However, using Biolystic, only the DNA of interest is inserted into intact cells and not that of the retrovirus. In addition, it is specific to target cells and carried out in situ. The technique employs gold "micro-carriers", 1.1 micron diameter particles coated with the genetic material, to insert the DNA into the cell.

These are accelerated on a larger micro carrier in a stream of helium gas. The microcarrier is stopped before it enters the animal tissue, firing the microcarriers into the cell. Genetic material can be inserted into the ears, thighs or, via surgery, into the livers of mice.

The next step, according to researchers, is to insert a therapeutically useful gene into animal liver cells. (*ECN*, 6/25/90, p. 24).

MYCOGEN REPORTS NEW BACILLUS THURINGIENSIS STRAINS

Discovery of novel strains of the bacteria Bacillus thuringiensis (Bt) that are toxic to plant parasitic nematodes has been reported by Mycogen Corp. of San Diego, California. Mycogen researchers have developed a novel test that is capable of identifying Bt biotoxins effective against these pests. Patents have been filed covering these discoveries.

The new biotoxins will most likely reach commercial markets in plants genetically engineered to be resistant to pests, according to Mycogen. The company is considering pursuing a collaboration with a company that has strong plant genetic engineering technology. (*Farm Chem Intl*, 11/1989, p. 78).

A NEW RAPID TEST FOR DETECTION OF RABIES VIRUS

An improved test for rabies detection has been recently reported. This involves a rapid cell culture technique for confirming the presence of the rabies virus.

In the new test, the rabies virus is grown in cultured mouse neuroblastoma cells, eliminating the need to confirm weakly positive fluorecent antibody test results by inoculating mice with clinical specimens and waiting for signs of infection. The main advantage of the new test besides reduced cost, is speed, as it provides results within 4 days, instead of taking up to 30 days. The new test was developed by Robert Rudd and Charles Trimarchi of the New York State Dept. of Health, Albany, New York. (*J. Clin Microbial*, 27: 2522-2528).

A NEW MAb-BASED RAPID TEST FOR DETECTING PERTUSIS

A new test based on a monoclonal antibody (MAb) detects small quantities of the tell tale pertussis toxin produced by the pathogenic bacteria Bordeletta pertussis. The new MAb-based test for pertussis uses an enzyme linked immunoabsorbent assay, configured as a dot blot test. The procedure is sensitive enough to detect 10 mg of pertussis toxin. Moreover, the test is highly specific.

In a prelimnary clinical study, undiluted nasopharyngeal aspirate specimens from confirmed pertussis patients gave 100% positive reactions in the assay. These studies are the first direct demonstration that pertussis toxin is produced and secreted into (such) secretions of pertussis patients at levels detectable by immunoassays.

The test was developed by Richard Friedman, Suzanne and James McMillan of Univ. of Arzona (Tucson). This alternative MAb-based test can be conducted directly on patients specimens and eliminates the need for a culture step. (*J. Clin Microbiol*, 27: 2466-2477).

THE WORLD'S FIRST EVER BACTERIA PRODUCED SURFACTANT

A new surfactant produced for the first time by bacterial fermentation looks promising as an ingredient in household and personal care products where 'natural', non-toxic and biodegradable are attributes that will set them apart from the crowd. This new yet-to-be named glycolipid was developed recently by researchgers at the Univ. of Illinois (Chicago) and has been licensed exclusively to a start-up firm Petrogen Inc (Arlington Heights, Ill), which sponsored the development project.

The glucoplipid surfactant has a wide range of potential applications that are being pursued by Petrogen. In the event of an oil spill, it could be sprayed on a beach, preventing the stick from sticking and forcing it back to sea, where it could be more easily cleaned up. It has also been tested in a sludge clean up application in a crude oil tank. In this use a water-sludge-crude oil emulsion is formed with the surfactant, allowing the oil trapped in the sludge to be recovered while reducing the sludge that must be disposed off.

Potentially more lucrative, however, are consumer products market. The product has potential in many other emulsifier applications, reports Petrogen, given its natural origin and its biodegradability. Potential markets include detergents (dishwashing and laundry), personal care products such as cold creams, food emulsification and metal treating. All these applications can open up provided the price of the surfactant is brought down with large scale production and the benefits of bacterial straining improvements. (*CMR*, 6/4/90, p. 23).

CALGENE RESEARCHERS CLONE A GENE FOR A KEY ENZYME IN THE FORMATION OF VEGETABLE OIL

Researchers at Calgene Inc (USA) recently described as a major technical achievement, their success last May in cloning a gene for a key enzyme in the formation of vegetable oils. The cloning of the gene for the stearoyl ACP desaturase enzyme will open the door to the production of high value oils uniquely tailored to meet specific edible or industrial needs, Calgene researchers report. The desaturase enzyme plays a critical role in determining the ratio of saturated to unsaturated fatty acids in vegetable oils. Thus, Calgene scientists expect that increasing stearoyl ACP activity will result in vegetable oils with a reduced concentrations of saturated fats. And since saturated fats are known to cause blood cholesterol levels to increase, reduction of those fats directly translate into healthier edible vegetable oils.

The Company initially plans to enhance the expession of the desaturase enzyme, with the assistance of a proprietary promoter, in canola. Incidentally, Calgene has been heavily promoting canola oil in USA in recent years as one of the healthiest of all vegetable oils, with only a 60% saturated fat content even in the natural state. Ultimately, this manipulation of the canola seed should lead to the production of an entire family to genetically engineered and nutritionally enhanced oils. Calgene researchers will be evaluating engineered canola plants for altered saturated fats composition in the summer of 1990, and expect to field test the most promising lines in 1991 as part of their research plan for genetic engineering programme for canola.

Production of the new canola oil formulations will be accomplished through the interplay between the stearoyl-ACP desaturase enzyme and a number of other oil synthesis genes, which the company is still in the process of cloning. The researchers expect over the next several months to complete work on series of different genes. Calgene has already successfully cloned one ACP gene which plays a major role in oil synthesis. Also, it has been able to transfer canola genes, and has developed seed specific promoters, which limit gene expression to the developing seed where oil is produced and stored. Specific field tests are slated for 1991, however, a number of other steps must be taken before these new oils are produced in commercial quantities. For instance, after proving it can replicate in the field what it has accomplished in the greenhouse. Calgene will have a number of regulatory hurdles to vault. Regarding oil production for industrial uses, that means winning the approbation of US Dept of Agriculture. And on the edible side, the FDA's regulatory obstacle course will have to be negotiated. Calgene is looking at 1994 or 1995 before it can see wide scale production. (*CMR*, 5/28/90, p. 10).

GREENHOUSE EFFECT OF FUELS COMPARED

To minimize global warming, natural gas is preferable to other fossil fuels if leakage can be kept to a minimum, reports Henning Rodhe, professor of meteorology at Stockholm University.

The contribution of various gases such as carbon dioxide and chlorofluoro-carbons to the greenhouse effect can be calculated from their radiative properties and atmospheric concentration. Rodhe's analysis shows less carbon dioxide is emitted per unit of usable energy when methane (natural gas) is burned than when coal or oil is burned. However, the net contribution to global warming, must take into account spillage of methane — itself a powerful greenhouse gas — from pipelines and storage tanks. A switch from oil to natural gas would be justified on global warming grounds if leakage can be limited to 3 to 6% Rodhe concludes (*C & EN*, 6/11/90, p. 20).

BIOTECH, MATERIALS ABSTRACTS PICK UP AT CAS

Five year data from Chemica Abstracts Service confirm what wa already suspect. Scientific activity i biotechnology and materials science ha picked up dramatically in recent years An analysis of the number of abstract in certain subject sections of the CAS data base from 1984 to 1989 shows section 3, Biochemical Genetics, has nearl doubled in total number of abstracts, 92% increase.

The number of abstracts in Section 7, Ceramics increased 70%. Almost 4% from 1988 to 1989 alone. Other reas showing growth of more than 30% uring the period include immunochenistry (34%), fermentation and bioinlustrial chemistry (36%), terpenes and erpenoids (36%), unit operations and processes (48%), essential oils and cosmetics (53%), surface chemistry and colloids (34%), radiation chemistry, photochemistry and photographic and other reprographic processes (45%) and electric phenomena (46%). (*C & EN*, 6/11/90, p. 20).

FIELD TEST UNDER PROGRESS FOR GENE-MODIFIED CORN

Field testing of genetically engineered corn plants was begun last June at Bio Technica Agriculture's corn breeding stations near Lisbon, Iowa following USDA approval of the test. The test is designed to study growth of the transformed corn under field conditions and to gather environmental data for use in future tests, the company reports. Bio Technica announced last January that company scientists had demonstrated that corn plants possessing an introduced gene were stable, fertile and capable of transmitting the gene to the next generation.

The Overland Park, (Kansas) company is developing corn, soybean alfalfa and wheat plants gfenetically altered for improvements such as insect resistance and enhanced yield or nutrition. It has conducted several other field tests, including one last year with tobacco plants modified to contain a gene encoding high levels of the essential amine acid lysine. The gene is being introduced into corn in order to produce high-lysine corn hybride. (*C & EN*., 6/11/90, p.20).

DU PONT TO MARKET BIO INSECTICIDE

Du Pont plans to market Nordick's biological insecticide based on Bacillus thuringiensis (trade name Biobit), through its agricultural products group. The agreement between Du Pont and Novo Nordisk (Denmark) will allow Du Pont to distribute and market Biobit throughout the USA for insect control on fruits, vegetables, cotton, soyabean and alfalfe crops in wettable powder and flowable concentrate under the Novo Nordisk brand name. The Danish company retains the right to directly market its products for application in forestry and public health markets. Du Pont reports that Biobit is highly effective when applied with its Lannate, Asana XL and Vydate L chemical insecticides as part of an integrated pest management programme. (*C & EN* 6/17/90 p. 7).

BIOTECH COMPANIES BECOME VIABLE ENTERPRISES, OFFER STOCK IN USA

Mycogen (San Diego, USA) company is expanding its previously announced public stock offering from 1.7 million to 2.5 million shares. With an offering price of $17.75 per share, the more than $44 million offering will give the company capital to support development and commercialization of its biopesticide products.

Another agricultural biotech company, Crop Genetics International has filed with the Securities & Exchange Commission for an offering of 2 million shares of convertible exchangeable preferred stock. The new stock issues in this company will be convertible to common stock at any time and redeemable by the company after June 1992. Proceeds will be used to support R & D and commercialization of the company's plant vaccines and herbicide products.

Another biotech company Repligen (Cambridge, Mass) plans to sell 2 million shares of common stock. Most of the shares about 1.23 million, will be offered by Centocor with the remaining 775,000 offered by Repligen. Centocor is selling its interest in the company to provide fund for its own business. The above development in USA indicates greening of biotech business and depicts growing confidence of biotech companies toward financial viability. (*C & EN*, 6/11/90, pp / 7-8).

MYCOGEN ANNOUNCES COLLABORATION WITH S.C. JOHNSON & SONS TO DEVELOP BIOLOGICAL PESTICIDES AGAINST HOUSEHOLD PESTS

Mycogen, an agricultural biotech firm based in San Diego, USA has recently announced their collaboration with S.C. Johnson & Sons (Racine, Wis) — a manufacturer of consumer products including commercial insect control product — for a joint R & D for developing biological pesticides against household pests. Johnson will provide Mycogen with research funding. This with Johnson, will give Mycogen with research funding. This with Johnson, will give Mycogen its entry into the retail household pest control market. (*C & EN*, 5/21/90, p. 9).

A PEPTIDE DESIGNED TO ACT LIKE ENZYME

A peptide with esterase activity similar to that of the serine protease chymotrypein has been designed by adding a series of catalytic amino acid residues to a synthetic peptide. Biochemists Kar Aakin and his colleagues at the Univ of Colorado, Medical School, Denver point out that 'adding an enzyme lik constellation of catalytic amino aci residue to..... synthetic peptides had no been previously accomplished'.

Using computer modeling, th research group designed a bundle o four parallel, alpha-helical peptides an added three residues found in serine pro tease catalytic sites to one end in th same arrangement as in Chymotrypsin Also included were an 'oxyanion hole and substrate binding pocket for este substrates. (*Science*, 248, 1544, (1990)

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Science Briefs

BOOST TO OCEAN ENERGY

The long-standing proposal to tap non-conventional source of ocean energy for power generation is expected to get a fillip with a joint team of the Tamil Nadu Electricity Board and the Ocean Energy Cell of Indian Institute of Technology, Madras, commending the offer of the U.S. based firm Sea Solar Power (SSP) to set up six Ocean Thermal Energy Conversion (OTEC) plants of 100 MW capacity each along the Tamil Nadu coast for serious consideration and recommending the setting up of one plant to begin with at Kulasekarapatnam area.

The Department of Non-Conventional Energy Soruces has proposed to have a meeting at Madras shortly with representatives of the Tamil Nadu Energy Development Agency, the TNEB and other experts to consider various aspects of the project and decide on future course of action.

According to the joint report of the TNEB and IIT Ocean Energy Cell, the OTEC is a viable alternative for the future. Even though the cost of power from OTEC may not be cheaper than that of hydro and other conventional sources today, there is an immediate need to develop this technology. The proposal of the American firm to install OTEC plants may be given serious consideration provided their investment and other conditions are acceptable, the reports say.

Since detailed oceanographic data collection along the South Indian coast to choose a new site for the proposed plant may require at least one more year and involve a cost of a few crores of rupees, the joint team has recommended that further data collection for locating the exact site may be limited to Kulasekarapatnam area. The operation of the OTEC plant will facilitate collection of all relevant data to finalise the environmental impact of OTEC plant gets operational in the future.

Kulasekarapatnam has been preferred by the team after evaluating three other areas, namely Marakkanam, Pondicherry and Cuddalore. One of the main reasons for this is that Kulasekarapatnam in the Gulf of Mannar is free from cyclone havocs and meteorological disturbances, whereas the other three are perpetually prone to storms. From a number of other criteria like sediment drift rate, sediment distribution, geology and profile of sea bottom, Kulasekarapatnam has been favoured.

Generally, Southern India is found to offer many possible locations for OTEC plants because the surface temperature of sea water along the coast of Tamil Nadu is about 25 degrees C throughout the year. Moreover, Tamil Nadu is a power deficit State and lacks conventional sources like coal. The only source of thermal power it has is lignite and this is fully exploited. Hydel sources, too, have been fully exploited and there is little scope for new hydel projects.

Tamil Nadu's power requirements are projected to increase from 20,414 million units at the end of the Seventh Plan to 30,614 million units at Eighth Plan-end whereas the availability will increase from 18,107 million units to 27,055 million units. Thus, the deficit will rise from 2,307 million units in 1989-90 to 3,559 million units in 1994-95.

In the light of these projections, OTEC is considered a boon for Tamil Nadu. In fact, the TNEB had sent a proposal to the Central Government ten years ago to put up a 25 MW OTEC plant on the east coast of the State but this was not sanctioned. Meanwhile, the offer of the American firm came for putting up six OTEC plants of 100 MW each. Naturally, the Centre's response was lukewarm as no OTEC plant of such high capacity had been put up anywhere. The OTEC plant at Hawai is of 40 MW capacity, and the one i Nauru is of 100 KW capacity only. Th Tahiti plant is of 5 MW.

The OTEC working group set up b the Department of Non-Conventiona Energy Sources had designed a on MW OTEC plant and recommende setting up of such a plant in Lakshadweep island. As regards environmenta aspects, it is pointed out that though i general commercial OTEC development may affect the atmosphere, the terrestrial environment, the marin eco-systems and various human activities in the vicinity of development an operation sites, the net environmenta impacts from commercial OTEC development will be minimal as compare to impacts from fossil fuel and nuclea power production.

The capital cost per KW of powe production is estimated at 1000 dollar for OTEC plant compared to 1100 dollars for oil-based, 2200 dollars, fo coal-based, 2340 dollars for hydro an 2450 dollars for nuclear power. The fue costs in the case of OTEC is practicall nil. Moreover valuable byproducts ar obtained from OTEC plants.

These include fresh water for irrigatio and drinking, hydrogen and oxyge which can be used as feedstocks i manufacture of other products ammonia that can be used as fertilize and methanol that can be mixed with gasoline. If the value of the power and byproducts are added together, the annual income of a typical 100 MW plant can amount to more $100 million.

Courtesy: Urja, August 1990.

BIOLOGICAL AGENTS FOR CROP PESTS

Demonstration trials for the contro of potato tuber moth was carried ou very recently with biopesticide **Bacillus thurengiensis** (BT) variety **kenyae** in country type potato seed storage facility called Arani in farmers' storages sites at three villages in Pune district.

The scientists of Bio-chemical Group of Bhabha Atomic Research Centre (BARC) who developed this variety of BY and carried out the trials used the pesticide in the form of fine dust (100 g per quintal) in about 10 quintal storage. After three months the result showed a 95 per cent success. Earlier the efficacy of this BT was evaluated independently by the Entomoloy section of the College of Agriculture, Pune.

Potato tubermoth causes excessive damage to potato crop as well as to potatoes during storage especially in regions with warm elimate.

Exactly a year back the Malaria Research Centre in New Delhi started an experiment where thousands of local and exotic fishes were released in mosquito-breeding waters across the country — to combat malaria. This is in accordance with a plan recommended to the Indian Council of Medical Research. Field trials in malaria-endemic areas have helped identify at least five species of fishes which feed on mosquito larvae breeding in streams, wells and stagnant pools.

Actually biological control of pests started exactly 101 years back. At that time a scientific strategy was developed to combat the dreaded cottoncushion scale insect which threatened to destroy the citrus fruit industry in California, USA. Scientists of the US Department of Agriculture accordingly released 129 imported Australian vedalia beetles into affected citrus groves on an experimental basis. The beetles effectively destroyed the pest and the pests never appeared again.

These are some of the instances to illustrate how an organism can be used effectively to resist the spread of disease-causing germs, insects, parasites and pests. The ambit of biological control, as this strategy is called, covers a wide spectrum of approaches ranging from use of obligate parasites (which cannot survive outside hosts) to toxin producing micro-organisms, pathogens and non-toxic behaviour modifying chemicals.

Although in the last 100 years, there were some success stories of biocontrol measures, development of chemical pesticides have from time to time distracted the attention of scientists. In 1939 with the startling discovery of DDT, chemists realised they could fairly easily formulate new hydrocarbon pesticides. No one then foresaw any problems with these toxic substances (DDT was banned all over the world but India still uses it widely.) But by 1995, when people realised the damage caused to the ecosystem by chemical pesticides, the focus of scientific attention shifted to biological controls once again.

Now armies of bugs and microbes, their powers enhanced in some cases by genetic engineering, are being unleashed in fields and laboratories in a widening effort to control destructive agricultural pests without resorting to chemical pesticides. Although biological control accounts for only about one per cent of the 20 billion US-dollars spent globally on pest control each year, research in this field is rising sharply. There is a big information explosion. Ten years ago, only one per cent of 500 or so scientific papers presented at annual meetings of plant pathologists dealt with biological control today, 25 to 30 per cent do.

On one research frontier, scientists are isolating and mass-producing genes from one strain of bacteria that produces an antibiotic to kill disease organisms. They are transferring the genes to other varieties of bacteria, creating new strains that can use the same antibiotic. By such gene transfers, they hope to tailner-make micro-organisms that can control diseases in environments where none otherwise would, to enhance the potency of control microbes; to make a single strain of microbe effective against more than one pest, and to design control microbes that will commit suicide after doing their job. In a parallel effort, they are also trying to incorporate disease-resistant genes in the crops themselves, and some of these agents are expected to be commercially available in the next five years.

The most common bio-control agent (BCA), in use world over, is the bacterium **Bacillus thurengiensis** (BT). this broad spectrum pesticide is being marketed by multinationals. Commercially, bacterial and fungal agents have displayed amazing potential for pest destruction, but problems invariably arise over their 'cost effectivness', patentability and registerability.

The agrochemical industry believes that biotechnology development will increase the utility of BCAs, and is therefore, conducting 'in-house research' to advance it.

However, as Dr. A.R. Jestum of the Imperial Chemical Industries Plant Protection Division of Berkshire in the UK observes: "BCAs will not replace chemicals in the foreseeable future, but will complement them and allow the development of improved integrated control measures".

Some experts strongly believe that biology will eventually overtake chemistry as the predominant means of pest control. "It is going to have to", said Lester E. Ehler, a professor of entomology at the University of California, USA. But he also pointed out that " it is dangerous to rely solely on biological control because it doesn't always work." Ideally, Prof. Ehler and others including Dr. K. Raghu of BARC feel that biological controls should be used as part of an integrated approach that also involves crop rotation, new strains of disease-resistant crops and some chemical pesticides — with chemicals used sparingly, as a last resort. A microbe might work in one part of the country but not another, or in one season but not another. Although biological agents tend to be more stable and longer-lasting, they generally do not bring about the dramatic kill that chemical pesticides can, rather, they holdpests within tolerable bounds. All this makes companies reluctant to stand behind guarantees.

In India, certain guidelines were recently formulated by the Government for the registration of the BT. But the authorities somehow, have not yet been convinced about the safe use of BT. Besides several Indian laboratories and agricultural univesities are working on bio-control methods, but so far not much has been achieved in producing commercially viable products for the market.

The use of BCA requires re-education of farmers, growers and pest-controllers, so that they are convinced of not only using a better product but also a cheaper one. Nevertheless, one fact that cannot be ignored is that many microbial pathogens available today fail to meet international standards or the expectations of the agricultural industry.

Several strategies are thus being devised by the scientists working this field in a manner that does not damage ecosystems so that at least their social obligation towards protecting the environment from pollution and depredation is fulfilled.

NAZI SOLUTION TO OIL CRISIS

As the world braces for a rerun of the 1973 oil crisis, scientists at Texas AM University are hoping they will get the chance to pore over documents seized after the fall of Nazi Germany in search of the forgotton secret of cheap synthetic petroleum.

Richard Waineridi, a former AM professor who currently heads Houston's Texas Medical Centre, said he was convinced that the microfilm archive he helped put together, contains the key that would enable developed nations to end their dependency on imported oil.

About 90 per cent of the documents have never been examined or translated since Wainerdi and his colleagues scoured institutions such as the West German record office, the Library of Congress, and London's imperial war museum to assemble the archive.

All the documents relate to the 25 plants that produced synthetic oil in Germany between 1936 and 1945, pumping 90 per cent of the Luftwffes aviation fuel and 68 per cent of the military's other petroleum requirements into the Nazi war machine.

Texas AM professor Arnod Krammer said any sophomore chemistry student understands the process by which natural carbon deposits such as coal can be transformed into synthetic petroleum derivatives.

The trick, he said is to do it cheaply — or cheaper, at least, than the going price of the imported product which account for 54 per cent of the US oil consumption. The answer, he says, may have been literally under their noses all along.

"We are spending US $28 million per day to protect the oil fields of the Gulf but it would take just one million dollars for us to put the information in these documents at the disposal of industry", Krammer said.

Funding for the project — dubbed Project Wassandra — was easy to come by in 1975, when Krammer, Wainerdi and their colleagues began gathering the documents.

Memorary of many queueing up at petrol stations in the wake of the OPEC production squeeze of the early 1970s was then fresh and painful, but when world oil prices plummeted a few years later, the money for follow-through research dried up. "Nobody learned their lesson back then", said Krammer, and insisted that it was ridiculous to keep the US economy artificially addicted to Arab oil.

What he was proposing was no pipe dream, he insisted. using only the basics of the Nazi-developed technology, US researchers built an experimental plant that produced a daily output of 200 to 400 gallons between 1949 and 1953.

The prices, "just over a cent and a half a gallon", Krammer claimed, adding that the information set out a long-forgotten official report prepared by the US Bureau of Mines.

"Nobody knows why the Federal Govenment abruptly withdrew its support but everything seems to point to big oil companies being behind the decision because they were not happy about the competition they were in for, " Krammer speculated.

Moreover, some of the German scientists involved in the World War II project later emigrated to South Africa, where their expertise was used for secret installations producing 37 to 50 per cent of the oil consumed in that country from its extensive coal deposits.

The United States also has plenty of coal and much of it is in Texas, which could develop a synthetic oil industry on a scale to rival the boom the State has enjoyed from natural oil.

M.S. NAGER, NEW IRE CHEIF

Mr. Mukunda Shenoy Nagar, has been appointed Chairman and Managing Director of the state-owned Indian Rare Earths Ltd. Prior to this, Mr. Nagar was Director (Technical), Mineral Exploration Corporation Ltd., Nagpur.

An expert in the field of mining, Mr. Nagar has occupied various positions in the Department of Coal and the Bureau of Public Enterprises.

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MATERIALS MANAGEMENT
Part XVII - Surplus and their Salvaging

N.R. PAI

Managing Surpluses -- Materials Managements job

To look into surplus materials, identify them and to dispose them off is the job generally assigned to the purchasing section of Materials Management department. This is because of the simple reason that this section is always in touch with the market, is aware of market positions and market fluctuations and hence it is in the best position out of all the management offices to dispose off surplus at the highest obtainable price. It is worth noting that all organisations have surpluses and hence their disposal is a universal problem in the industrial world. Therefore accumulation of surpluses should not be looked upon as a mark of inefficient functioning of an organisation. Again, sale of these surpluses does contribute to substantial amount of income. It therefore plays a significant role in the healthy functioning of any firm.

Where from these surpluses heap up?

Well! They have several origins and each one of them contributes to their accumulation in a running organisation. The factors contributing to surplus accumulation can be enlisted as follows:

a) Faulty manufacturing procedures
b) Buying in excess of immediate foreseeable needs.
c) Short storage life of material bought.
d) Manufacturing processes becoming outdated and as a result the material bought becoming obsolete.
e) Rough or bad handling especially of sensitive materials.
f) Faulty storage.
e) Faulty packaging.

For the purpose of study we can classify these origins of surpluses into the following broad categories:

1. Obsolescence

It is well-known that technology is advancing by leaps and bounds these days. As a consequence, many substances, materials or items that were once used as starting materials may become outdated and obsolete in due course of time. Their place will be taken by new raw materials which have an edge over their predecessors by way of their lower cost, better availability, by way of final product improvement or as a result of shortenings of the manufacturing process which then can be carried out with less number of steps, thereby stepping up production against time, a point which any production manager would like to achieve.

The older raw material or previous spare or component parts thus become obsolete and need their disposal. So, the obsolete material is an undamaged, good material which is no longer in use because of process, design or model alterations.

2. Waste

It is a substandard material of poor quality which has no standing in the market if sold as such. It is a result of bad process supervision or reckless manufacturing where different parameters of production procedures are not adhered to properly, resulting in final product/s that cannot be passed by the quality control department, as they cannot come upto the customers requirements. Such products if sold as such would violate the contract terms and would lower the image of the manufacturing company in the eyes of the customer thereby spoiling buyer-supplier relationships which have long terms effects on the organisation's functioning.

Then there is another kind of waste that gets accumulated in a running organisation. To this class belongs: packaging material that is left after unpacking the goods received, waste papers, waste rags of cloths, unwanted wooden strips, blocks and chips and at times even saw dust. Then there are side cuttings from foam rubber and thermocole, glass-wool, corrugated card-boards which are used as stock absorbents in packaging. This typical non-metallic refuse that comes out on unpacking along with iron hoops and wires used in strengthening packaging, find no use in the organisation where they are generated but can be sold to the right customer after their proper segregation into separate classes to cash their value.

3. Scrap

Scrap is different from waste. It is a result of not utilising fully the raw material/s employed in manufacturing processes. There are hardly few manufacturing processes where raw material is used totally or to the extent of 100%. Scrap, therefore, is a regular outcome of most of the production processes. Examples that can be cited are: turnings coming out of lathe working, end cuttings of H-planks and I-girders from construction industries, side cuttings from sheets of metals, plastics, leather, cardboard, wood, foam-rubber, thermocole etc. They have their own value that can be cashed to the benefit of the organisation.

. Overexuberant purchasing practices

Sometimes forward buying or speculative purchases prove erroneous in the course of time. As a result material bought is in sufficient excess of the regular or even immediate future requirements of the company. Such material then does not have regular outlet through production system. As a consequence it unnecessarily blocks storage space and finance flow in terms of unneeded heaped up inventory. Organisation has to unnecessarily bear substantial holding cost because of the accumulation of such material due to the company's over-procurement policies. Their quick disposal is then necessary to release the funds they have blocked, which can be used for more fruitful purposes.

5. Spoiled goods

To this class belongs damaged or spoiled items. The deterioration is a consequence of bad, careless handling or it may be because of the poor shelf-life of the product. The third possible reason is that conditions required for its healthy storage have been violated. This happens in case of thermally sensitive goods, which are required to be preserved at low temperatures, but which instead get exposed to higher temperatures due to faulty refrigeration. Sometimes, exposure to rain and excessive heat may lead to the rusting or to the spoilage of goods rendering them unfit for use.

6. Outdated or spoiled machines, equipments, accessories or vehicles

Spoiled or damaged equipment, machines, their accessories or company vehicles which cannot be repaired or whose repairing cost does not justify their further utility for sufficient length of time, should be disposed off. Sometimes, as a result of technological advances, process innovation that is achieved calls for new machinery and equipment rendering the previous one useless and superfluous. Such items should then be classed as disposable goods and should be removed from the factory premises at the earliest.

Disposal of Surpluses and Salvaging

Surpluses in any of the above mentioned six forms should be salvaged. Salvaging amounts to disposal of organisation's goods at an economically sanctioned rate, since they are of no further use to the organisation. The first step in salvaging therefore amounts to identifying such goods.

Identification of surpluses

Surpluses can be identified by emplying F-S-N classification described under selective inventory control in our previous communication viz. (Materials Management, Part VIII-Inventory and its Control (Contd), *Chemical Weekly*, 19 Sep. 1989, page 93). As described therein F-S-N stands for Fast moving, slow moving and non-moving items respectively. An arbitary rule often applied aims at disposing off any item which has been inactive for an year or so. These inactive non-moving items are easily spotted out by the use of computers. Such items are identified and disposed off periodically at the best available price. No doubt the computerised approach makes the process of spotting out quite easy and without the use of computers the procedure becomes cumbersome; however, even then it is very necessary to adopt this spotting out through manual working.

Decision to Salvage

The final decision to dispose off or to retain items classed as surpluses is now-a-days based on cost-benefit analysis. It can be with a mathematical approach. In case inequality (i) given herebelow holds good an item can be continued as an inventory; if not the item should be disposed off.

$$\frac{p(I)C}{HS} > 1 \quad \ldots\ldots\ldots\ldots \quad \ldots\ldots \quad (i)$$

Here,

$p(I)$ = Probability of item utilization in an year's time.
C = Stands for cost or market price of the item.
H = Cost of holding the item for an year.
and S = value of the item if salvaged immediately.

Advantages of salvaging

i) Funds locked in inactive items are released for better use.
ii) Space occupied by these non-moving goods is set free for more profitable use. Space is quite costly these days and it should be skillfully utilised to get the highest advantage.
iii) Any further spoiling or deterioration of the goods which is salvaged immediately, is avoided.
iv) The spoiled material can contaminate surrounding goods and spoil them in turn. Salvaging prevents it in time.
v) Losses on surpluses can attract tax rebate.
vi) Salvaging adds substantially to the organisation's income.
vii) In case the surplus in the form of waste is too much, production department can be summoned to look into the excess waste. The reason may be bad supervision, faulty machines, improper processing etc. The faults can be identified first and then promptly rectified so that further losses by way of wasteful production are avoided in time.

Collection of surpluses

This is one of the important aspects of salvage operations. Items and materials of the same type should be collected at one place. They should be stored properly and handled carefully like raw materials, since they represent money locked up. Scrap of one kind should be separated carefully from other scrap and preserved in coloured containers. Each type of scrap should have a separate colour code for preserving it and it should be seen that it does not get mixed with the rest of the surpluses. Thus for example all iron turnings should go in red containers while brass chips should be preserved in yellow boxes and aluminium side-cuttings should be collected in white bags. It is important to note that scrap when mixed with other types of scrap does not fetch much value. On the other hand, segregated scrap can be easily sold at a handsome price.

Again, handing over the scrap to the buyer directly from the department where it is generated reduces material handling charges. It is therefore better to ask the purchaser to collect scrap periodically from operating department or workshop floor, if that is possible. As mentioned earlier waste in the form of unwanted packaging material obtained after unpacking of goods also fetches a good price, if collected, segregated and preserved properly prior to its sales.

Routes of surplus disposal

1. Utilizing surpluses within the organisation or in its sister concern

This can be better explained with an example. Consider an organisation manufacturing heavy leather items like travel bags, suitcases etc. It can send the side cuttings to sister concern manufacturing light leather items like leather belts, leather purses, dog collars, sketing straps, watch straps etc. Similarly a company engaged in the manufacture of heavy metal items can utilize its side cuttings for engraving beautifully designed novelty items or even name plates. Utilizing scrap in this way fetches prized income for an organisation.

2. Selling to the supplier

It is true that no organisation can expect its purchase-man to be always on the right side of the market, however efficient he may be. Mistakes do occur. Goods are purchased for needs that may not materialise. Sometimes goods requirements is overestimated. At times manufacturing programmes alter. Company may also go in for over-exuberant purchasing practices. All this may result in accumulation of excessive stocks, and their disposal becomes a "must" to release the money and space they have blocked. The best way of disposing off such goods is to sell them back to the supplier. Generally upto 90% of the price can be recovered that way. Good buyer-seller relationship is very helpful for this method of disposal.

3. Selling to another firm directly without involvement of a broker or a dealer

This is the next best source for disposal of surpluses. For example, scraps generated in an organisation may not h any use at the place where they are produced. However, q likely, they can be employed as raw materials in other fir Thus copper turnings generated in an engineering firm pickling liquor from a firm manufacturing copper cables be sold to a chemical firm manufacturing salts like cop sulphate for a handsome price. Iron scrap has generally t main outlets. It can be melted and reprocessed into iron ing or else it can go for production of iron salts.

4. Selling as seconds

Sometimes during production product produced carrie very nominal defect. It then cannot be classed as waste. Ho ever, its quality is not upto the mark to keep up the prest of a prestige-conscious company. The best way then is to s such products as "seconds" at a reduced price in an open m ket where the purchaser is told about the defects which compensated for by the reduction of its actual market pri

5. Selling through a dealer or a broker

Many old items like B/W T.V. sets, second-hand radio s used transistors, might have become outdated in cities. I they can be sold in remote villages after repairs, if need at a comparatively good price. Old B and W T.Vs from cit thus do find good market in villages. Old models of au mobiles also come under the same category. Since a dea or a broker knows the market his help can be sought for th disposals.

Apart from the above mentioned items, scraps, wastes e can also be sold through brokers when their direct selli to other firms is not possible.

6. Making employees as customers

This is one more line open for disposal of surpluses. Dru and metal or thick plastic containers can be sold to t employees after their contents are exhausted. Often they a used for household water storage. The goods which oth wise would go as seconds in an open market can also be so to the employees at concessional rates. That way compa has a ready buyer while employees gets the goods at a che price. Both are benefitted. It also helps in building employ employee relationship.

7. Discarding

If none of the above lines are open for disposal, surplus can be just discarded to free storage space or any other orga isational space they are occupying. This space can then used in a more fruitful manner for some other valuable st age. This procedure is often adopted in advanced countr like USA. Even items which may fetch sufficient price our country (for example newspaper waste) goes as a r ular garbage there.

educing Surpluses

Sometimes it is possible to reduce surpluses. Waste due faulty production can be minimised or even eliminated by troducing better supervision (especially at sensitive pro- uction steps) or by repairing faulty machines or even by placing outdated worn out equipment that is employed in ocessing.

Again, amount of scrap can be reduced by resorting to exact ecification to suit one's requirements. Thus, in case of uilding and construction companies, if I-girders, H-planks wooden beams are ordered to their exact, required length, ere will be no end-cuttings which would otherwise go as rap. In metal pressing industries, sheets of metals that are sed as raw material should be ordered with such accurate pecifications that maximum number of useful cuttings can e had from them, thereby reducing to bare minimum the crap due to side cuttings.

Dealings with surplus purchaser

It is always advisable to show the buyer the scrap or wast one intends to sell. He may examine it in his own way if h wants. This would certainly avoid future misunderstanding with him.

To get the best price one can even enlist probable buyers and ask for quotations from them. Before entering into actual contract for disposal of surplus, it is better to clarify terms of contracts like delivery schedules, "who will bear transport charges?" "How quality would be determined?" "How quantity would be ascertained?" i.e. "which procedure would be followed to fix weight of the material to be sold?". In case discrepancies (like shortfall in weights or excesses in weights) arise how will they be tackled. How and when payment will be effected. Sometimes penalty clauses are introduced in the terms of contract to avoid delay in surplus removal, delay in payment etc.

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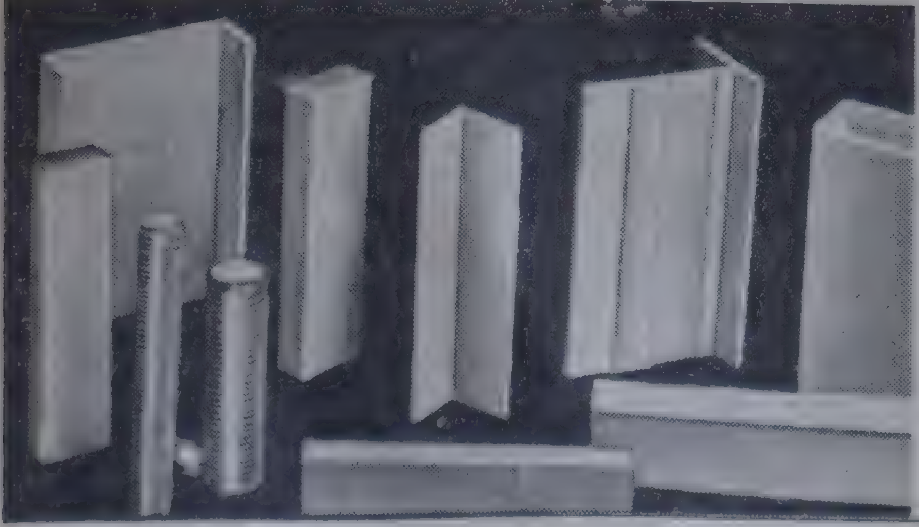

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Sickness in small and medium scale chemical industries

N.S. VENKATARAMAN*

Rarely a day passes without the advertisements appearing in newspapers about the offer of sale of sick industrial units. One or the other state industrial financing institutions occupy considerable space in the newspapers almost everyday, bringing out a big list of units available for sale, that have failed to repay the term loan to the institutions. In short, industrial sickness in India has become a fact of life, as much as human sickness is. Such sickness in chemical industries is particularly conspicous, since the chemical industries appear to be more prone to sickness than others and it is often contributed by multiple factors, making even the task of diagnosis of the cause of sickness very difficult, apart from working out suitable and adequate prescriptions.

Though the Government has recognised the seriousness of the problem and evolved various machineries to overcome the industrial sickness through institutions such as BIFR, IRBI and others, most of such measures have only ended up in carrying out the post-mortem, instead of avoiding the sickness itself. On a more careful scrutiny, it would become evident that what the Government can do in such cases is little and the initiative has to come necessarily from the promoters of the industrial units themselves. The system and the structure of the Governmental methods and procedures are such that the Government machinery is ill equipped to handle directly the crisis of industrial sickness, which requires quick decisions and initiative. Any attempt to speedup the Governmental procedures have only resulted in the relaxation of the system of check and control, which is very necessary in the Governmental departments, to avoid nepotism, corruption and misuse of funds. Further, the solution to the problem of industrial sickness would require high level of specialisation, expertise, and micro level knowledge and awareness of the various complicated factors, which is unlikely to be available with the Government departments. It is high time that every one realises that the responsibility for tackling industrial sickness should only remain with the management and the promoters of the industrial units, without expecting any high level of contribution from the Government sources. The Government is to govern and not to do business and tackling the problem of industrial sickness mainly concerns the business of running the enterprises.

A careful analysis of the sick chemical units would reveal the fact that most of such units are almost born sick and the causes of the sickness are built into the units themselves, at the project conception stage itself. The irrelevant background of the project promoters and the inadequate project appra sal, particularly in the case of small and medium sector, ha been found to be the chief cause of sickness in several uni In the SSI sector, the promoters have to combine within ther selves atleast the broad knowledge, to manage several po folios like finance, production, marketing and, of course, t Government departments/financing institutions, since the S sector cannot afford to employ specialists in various fiel to manage the show. The choice of project that has no re evance to the background of the entrepreneur is certainly major cause for sickness in small and medium sectors. number of cases can be cited, where persons with agricu tural background promote metallurgical units and perso with civil engineering background put up chemical project which invarioably make them face problems in the unit which they find extremely difficult to manage. Most of su persons learn their lessons at a heavy cost and finally, wh they understand the solutions, they are left with neith energy, enthusiasm nor resources to solve the problems.

Nothing can be a substitute for experience in industri management. The industrial problems not only involve tec nological and trading factors but also factors relating to huma management and public relations. A mere knowledge of tec nology alone on the part of the promoters has been four to be inadequate, just as mere capability in public relatio alone cannot take an entrepreneur beyond a level. One h to get a lot of practical knowledge and experience in a ha way, before becoming an adequate industrial entrepreneur a small and medium scale chemical industry. A number cases can be cited, where the units have become sick eve after producing good quality product, simply because it unable to deal with the market/dealer mechanism. In the cas of a number of chemical products, dealers control the mark forces due to their "money and staying power" and the ma ufacturers find themselves at the mercy of the dealers. N textbook could teach the entrepreneurs adequately regardi the manner of dealing with such situations, which may different from product to product, place to place and pers to person. Prior experience in dealing with the market mec anism for the particular product can be a very good asset the entrepreneur. When young persons, with degrees a diplomas in engineering and management subjects, put chemical units with enthusiasm on the basis of the knowled acquired from the classrooms and textbooks, they often fi themselves in terrible situations when confronted with t problems posed by unscrupulous market operations li over/under invoicing, adulteration, hoarding/artificial cre n of scarcity etc. It is high time that the financing insti-ions also recognise the importance of the relevance of the ckground of the entrepreneur and the need for their ade-ate experience, before extending financial assistance to all and medium scale chemical units. The present method chemical project appraisal based only on the projected ernal rate of return of the project and source of technol-y alone often lead to wrong decisions.

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The inadequate assessment of the various factors involv-technology, process yields and quality levels has lead to ckness in several chemical units. The case of units that have me to grief, due to the use of technology hitherto unproved commercial scale plant are well known. Even the know-w provided by several CSIR laboratories have failed in any cases in commercial plants. While it may not be pos-ble to get commercially proven technologies all the time, least enough precautions must be taken to overcome the ssible teething technological problems, by way of mental d financial preparedness.

Of the many small and medium sick chemical units, it can seen that most of them have become sick even within six twelve months of commissioning the projects. It is also mmon to find that such units blaming the banks and finan-al institutions for their problems, in view of the heavy delay processing the applications for financial assistance and lease of the funds, which result in project cost escalation. he banks have particularly been blamed for impractical ethods adopted by them for assessing the working capital quirements and often slashing down the working capital gures for the projects, from the original figures mentioned the applications for assistance. In their anxiety to com-ission the plant, small and medium entrepreneurs often ccept meakly the sanctioned working capital loan and com-ission the plant, hoping to persuade the banks to see reason ter on and raise the limits after sometime. But, such working capital constraints have often proved to be disastrous fo the new chemical units, especially when they have to face teething problems in stabilising the process operations and product quality level and tackling the market forces adequately. When such units, facing the problems and realising the urgent need for further working capital, approach the banks for assistance, the bank officials, often without adequate expertise and understanding in the relevant field, take unduly longtime to give their decisions, by which time the units may became hopelessly sick. It is no surprise that such units think that the problem of tackling industrial sickness is largely the problem of tackling the banks and financing institutions. The sure way to avoid the sickness in small and medium chemical units is to adequately appraise the projects before launching them, both by the promoters and the financing institutions. The inadequate project appraisals is certainly evident in all the chemical units that have become sick. The technology assessment, clear understanding of market mechanisms, proper assessment of working capital requirements, careful time schedule for project implementation and the fund release by the financing institutions have all become very vital factors in deciding the long term health and prosperity of the units.

Just as in the case of human sickness, prevention is better than cure in the case of industrial sickness also. The cure, in the case of chemical units, often becomes impossible due to the rising cost of machinery and inputs and the fast changing technological scenario. Under such circumstances, the organisations like BIFR, IRBI and others find themselves in "dead locked situations" most of the time, in their attempts to revive the sick chemical units. They often find that the problems of the sick units are due to fundamental factors and most of such units are born with potential sicknesss. Like the advocated 'mercykilling' in the case of sick human beings, the BIFR also often recommends that the sick units should be liquidated without even attempting to revive them.

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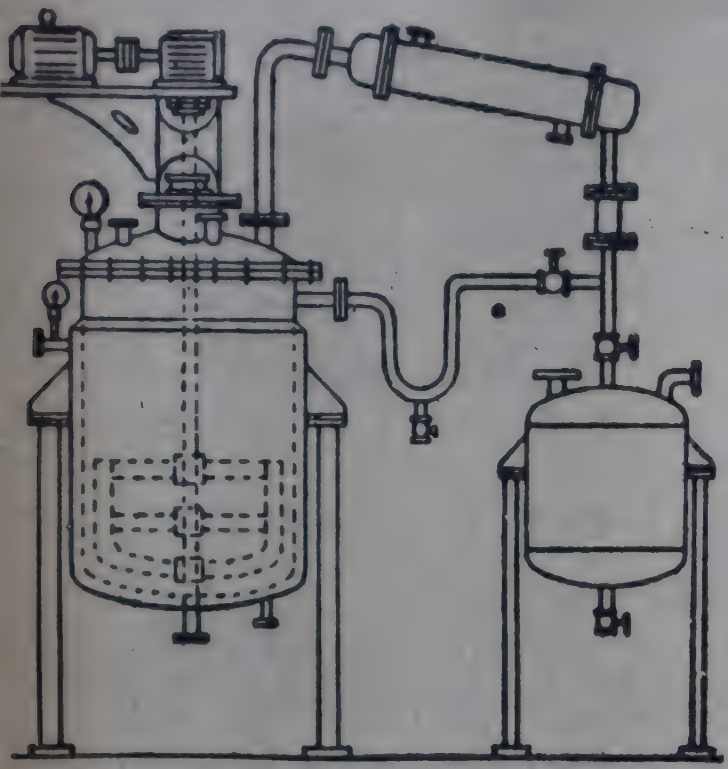

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Assessment of the Inter-Relationships between the various specifications of LAS

R. RAMU, C. RAMANATHAN & S. MAHESH KUMAR*

SYNOPSIS

This paper titled "Assessment of Inter-Relationships between the various specifications of LAS" primarily deals with the assessment of Active Matter, Free Acid and Free Oil based on yield. This helps the acid slurry manufacturers in assessing their process. An acid slurry manufacturer can gauge his process before start-up itself in the sense that he can approximately calculate his yield from the amount of water he is intending to use and from that yield, he can calculate the other specifications. This also helps in many trouble-shooting problems in slurry manufacturing units in the sense that if the manufacturer starts practicing the usage of these equations, he will in a period of time be in a position to know what essential parameters really control the process and when trouble arises, he will know what has caused the problem. When one finds, wherefrom the trouble has arised, 80% of the trouble-shooting is completed. The rest 20% is a comparatively easy task of just putting into action the necessary remedies.

Introduction

In the manufacture of Linear Alkyl Benzene Sulphonic Acid, it has become a general practice in small scale industries to assess active matter, free acid and free oil in terms of their percentages in yield. IS 8401 1977 gives the following specifications for alkyl benzene sulphonic acid (acid slurry).

Characteristics	Requirement for	
	Type 1	Type 2
Active matter as alkyl benzene sulphonic acid, per cent by mass, min.	93	85
Free alkyl benzene, per cent by mass, max.	2.0	2.0
Free sulphuric acid per cent by mass, max.	2.0	9.0
Colour of 10 per cent alcoholic solution (mass by mass) in 1/4" cell on Lovibond Tintometer, not darker than	3Y+0.5R	5Y+1R

This extract deals with the inter-relationships of the Free Acid, Free Oil, Active Matter, Yield, Percentage dilution water etc.

The Initial Approach

Before we proceed further, it is essential to define all the terms that are to be used in this extract.

1. *Y -- Yield:*
   This is the ratio of the product out and the LAB in.
2. *AM -- % Active Matter*
   This is the per cent of Linear Alkyl Benzene Sulphonic Acid in yield.
3. *FA -- % Free Acid*
   This is the per cent of Free Adhering Sulphuric Acid which is not washed off by water in yield.
4. *FO -- % Free Oil*
   This is the per cent of oily matter, i.e., the unsulphonated part of LAB in yield.
5. *W -- % Dilution Water*
   This is normally the amount of water used for washing the slurry. It is generally denoted in terms of kgs. of water per kg. of reaction mixture x 100.

Specimen

Say, for a LAB input of 1 kg, a dilution water of 0.22 kgs. is used where the sulphonating agent oleum 1.2 kgs. is used. The product acid slurry is 1.5 kgs. and the 100% LAS formed through the reaction is 1.3139 kgs. and the Free Oil is 0.02 kgs. and the Adhering Acid is 0.1088 kgs. The report is as follows:

Reaction mixture = 1 kg LAB + 1.2 kgs. Oleum
= 2.2 kgs.
Water = 0.22 / 2.2 x 100
= 10%
Active Matter = 1.3139 / 1.5 x 100
= 87.59%
Free Acid = 0.1088 / 1.5 x 100
= 7.25%

---

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Free oil = 0.02 / 1.5 x 100
= 1.33%

In the manufacture of acid slurry, there are typically two stages, one is the reaction stage and the other is the separation stage. In the reaction stage, the active part of the yield, i.e., Linear Alkyl Benzene Sulphonic Acid is formed and in the separation stage, the Adhering Acid is washed off with the help of water.

Therefore, in our terms, the AM is formed in the first stage and the FO comes along with it. The FA is the resultant of the second stage where W actively washes off the acid resulting in some typical value of FA.

The Proportionalities

It is vivid that higher the W, lower is the FA and lower the Y. Hence, we can arrive at typical proportionalities as follows:

1. Water is inversely proportional to Free Acid.
2. Water is inversely proportional to Yield.
3. Hence, Yield is directly proportional to Free Acid.
4. Yield is directly proportional to Active Matter.

After elaborate experiments and typical curve fits, it was found that:

Y x AM = A constant —— (1)
Y x FA = (Y - a constant) x 100 —— (2)

The constant in equation (1) is a measure of the conversion of LAB into LAS.

The constant in equation (2) is actually the non-washable part of acid slurry.

The Approach

It is clear that the Active Matter, Free Acid, Free Oil and Moisture in total by "MASS" constitute to the Yield.

Yield = LAS + Free LAB + Free Sulphuric Acid
+ Moisture —— (A1)

In these components Free LAB and LAS are closely related in the sense that, Free LAB gives a measure of percentage sulphonation of LAB which once again gives a measure of LAS.

Therefore, the amount of LAS formed / kg
sulphonation = 315.063 / 235
= 1.3407 kgs.

But, normally, only 98% sulphonation is

Now, the amount of LAS / Kg of LAB
= $\frac{1.3407 \times 9}{10}$
= 1.3139 kgs
Free LAB = 0.02 kgs

Now, assuming no FA and no moisture Y
= 1.3139 + 0.
= 1.3339

But, always some free sulphuric acid and
is there, a normal moisture content of 0.05
safely assumed as constant.

Y - Free Sulphuric Acid = 1.3139 + 0.
= 1.3912

The right hand side of the above equat
amount of non washables in yield and whatev
of water used, this part is a constant.

Approach Table 1

SOME TYPICAL EXPERIMENTAL RE
TPL PILOT PLANT LABORATORY, TR
OLEUM (20% free sulphur tri

S.No.	% W	Y	% AM	%
1.	0	2.2	60	3
2.	5	1.6	82.5	1
3.	10	1.5	88.5	
4.	12.5	1.48	90	

Yield - Active Matter Relationships

Based on the above workings, we will n
out a relationship between Y and AM. Ass
phonability and 1 kg LAB input, LAS for

Active Matter = (1.3139/Yield)
Active Matter x Yield = 131.39

Oil = (0.02 / Y) x 100
= 2 / Y

tion Water

= 0
= 2.2 ... from Approach table (1)
= infinite
= 0

= 0
= 1.3912

= infinite
= 1.3912

ve, it is clear that the Yield - % Dilution Water ould have these liming values. Now, we have :

e proportion Y
infinite, Y = 1.3912
0, Y = 2.2.

on types were tried and a best fit type was pe was,

2.2 - Y) / (Y - 1.3912) —— (A8)

onstant, this type met all conditions.

ach table (1), the values of W for correspond- ' were taken in (A8) and finally the value of as.

[illegible]

Yield - Dilution water relationship is

45 (2.2 - Y) / (Y - 1.3912) —— (A9)

ctive Matter = 131.39
= [(Y-1.3912) / Y] x 100
ee Oil = 2
Water = 1.5545 (2.2-Y)/(Y-1.3912)

R APPROACH

An attempt has been made to introduce better accuracy introducing some new terms like Molecular Weight and S phonability.

Our working in approach were all based on 235 as molec ular weight of LAB, and 98% sulphonatability. But, practi shows that these are all variables and hence let us introdu the variables as:

M - Molecular weight as LAB
S - Sulphonatability of LAB

Approach equation (A6) gives,

Yield x Active Matter = 131.39
131.39 = (315.063 / 235) x 98
= [(235 + 80.063) / 235] x 9

where 98 is the sulphonatability and 235 is the molecular weig of LAB respectively; introducing the newer variables M &

Yield x Active Matter = [(M + 80.063) /M] x S whe
80.063 is the molecular
of Sulphur trioxide

Therefore,
Yield x Active Matter = [(M + 80.063) / M] x S
= (M + 80.063) x S/M

In (A7) and (A8), we come across a constant 1.3912.

1.392 in (A7) and (A8) actually represents the non washables in Yield (Ref. Approach).

Definition

Non-washables in Yield:

It is the sum by mass of LAS, Free LAB, Moisture in Yiel It shows non-variance with dilution water (i.e.) whatever th amount of water used, this remains a constant. It is also th yield at infinite dilution water condition.

from (A1),
1.3912 = 1.3139 + 0.02 + 0.0573

Using the newer variables and using a variable C2 instea of 1.3912

C2 = [(M + 80.063) / 100] x S/M + (100-S) / 100 + 0.057
= MS/100M + 80.063/100M + 1-S/100 + 0.0573
= S/100 + 80.063 S / 100M + 1-S/100 + 0.0573
= 1.0573 + 0.80063 S/M

[illegible]

s used as the sulphonating agent, the yield without separaion is 2.65 and K is 0.65.

Summary

$C1 = S / M$ .... (NA 1)

$C2 = 1.0573 + 0.80063\ C1$ .... (NA 2)

$Yield \times \%\ Active\ Matter = (M + 80.063)\ C1$..... (NA 3)

$\%\ Free\ oil = (100 - S) / Y$ .... (NA 4)

$\%\ Free\ Acid = (1 - C2/Y) \times 100$ .... (NA 5)

For oleum (20% free sulphur trioxide)
Dilution water $= 1.5545\ [(2.2 - Y)/(Y - C2)]$ ..... (NA 6)

For 98% sulphuric acid,
Dilution water $= 0.95[(2.65 - Y) / (Y - C2)]$ ..... (NA 7)

For oleum (20% free sulphur trioxide)
Yield $= (C2W + 3.4199) / (W + 1.5545)$ ...... (NA 8)

For 98% sulphuric acid,
Yield $= (C2W + 2.5175) / (W + 0.95)$ .... (NA 9)

Using above equations by knowing Yield, Molecular weight and sulphonability of LAB, Active Matter, Free Oil and Free Acid are calculated. The same values are compared with the actual experiments conducted. The results are both calculated and experimental values are tabulated. The error for AM is 0.06%, for Free Oil 7.0% and for Free Acid, it is 0.7%.

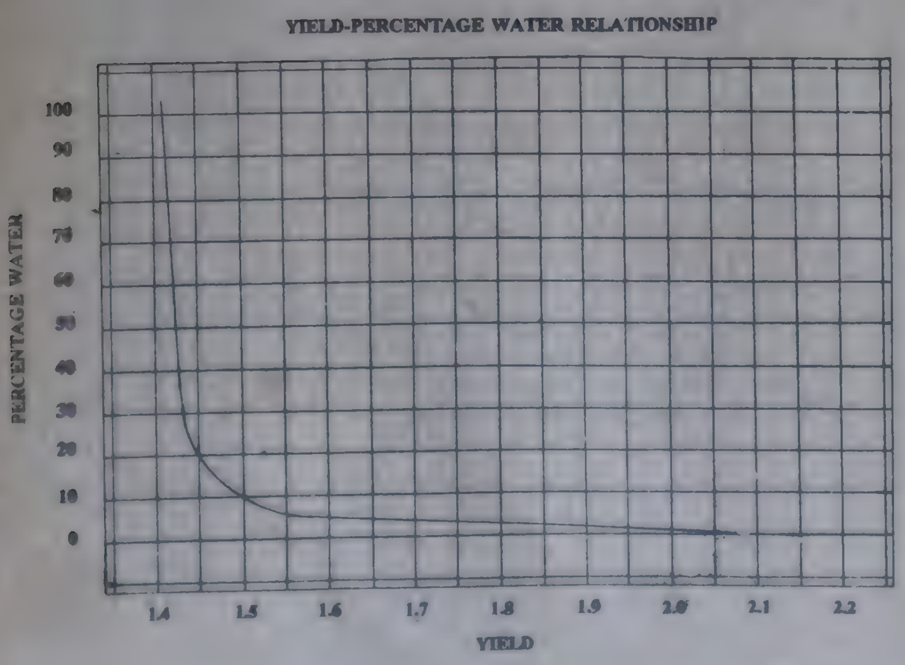


Fig. 1

YIELD

S.No.	Observed value	Experimental value	% Error
1.	1.465	1.4309	+ 2.738
2.	1.470	1.5110	- 2.714
3.	1.475	1.445	+ 2.038
4.	1.480	1.542	- 4.038
5.	1.485	1.4365	+ 3.378
6.	1.487	1.4384	+ 3.375
7.	1.490	1.5102	- 1.340
8.	1.493	1.523	- 2.005
9.	1.495	1.535	- 2.668

Average percentage error = - 0.1375

ACTIVE MATTER

S.No.	Observed value	Experimental value	% Error
1.	90.08%	90.61%	- 0.585
2.	89.73%	89.60%	+ 0.145
3.	89.42%	89.51%	- 0.1005
4.	89.12%	89.05%	+ 0.1348
5.	88.82%	88.96%	- 0.1574
6.	88.70%	88.94%	- 0.2698
7.	88.52%	88.41%	+ 0.1244
8.	88.34%	88.52%	+ 0.1020
9.	88.23%	88.16%	+ 0.08

Average percentage error = - 0.0585

FREE ACID

S.No.	Calculated value	Experimental value	% Error
1.	5.03%	5.16%	- 2.5
2.	5.36%	5.43%	- 1.2
3.	5.68%	5.74%	- 1.04
4.	6.00%	5.94%	+ 1.01
5.	6.31%	6.24%	+ 1.122
6.	6.44%	6.40%	+ 0.625
7.	6.63%	6.82%	- 2.786
8.	6.81%	6.85%	- 0.584
9.	6.94%	7.01%	- 0.998

Average percentage error = - 0.7057

FREE OIL

S.No.	Calculated value	Experimental value	% Error
1.	1.02%	1.1 %	- 7.2
2.	1.02%	1.12%	- 8.9
3.	1.02%	1.05%	- 2.85
4.	1.01%	1.14%	- 11.4
5.	1.01%	1.10%	- 8.18%
6.	1.01%	1.09%	- 7.30
7.	1.01%	1.00%	- 1.0
8.	1.01%	1.09%	- 7.3
9.	1.00%	1.10%	- 9.09

Average percentage error = - 6.8022

YIELD - % AM, % FA, % FO RELATIONSHIPS

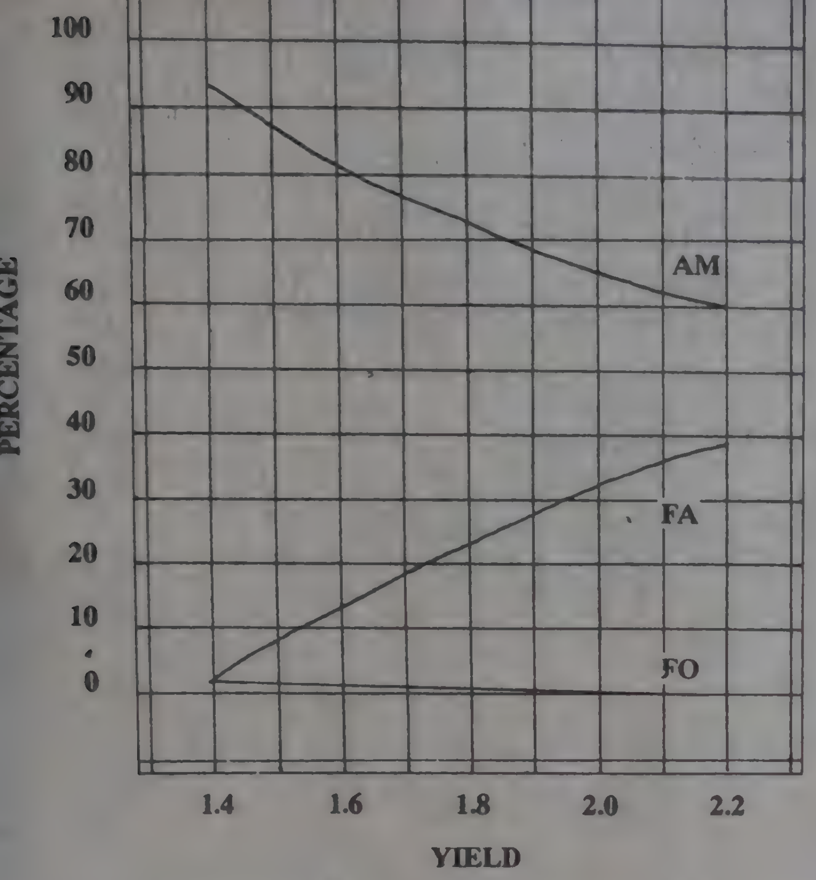


Fig. 2

YIELD - % AM, % FA, % FO RELATIONSHIPS

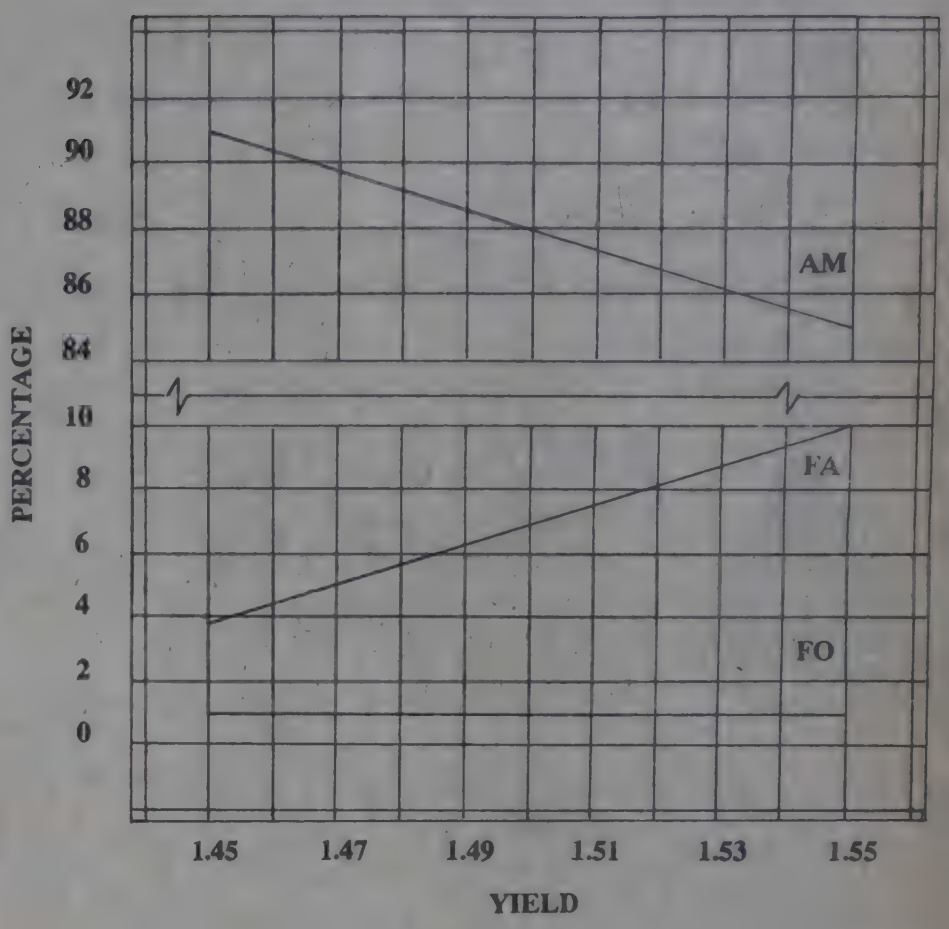
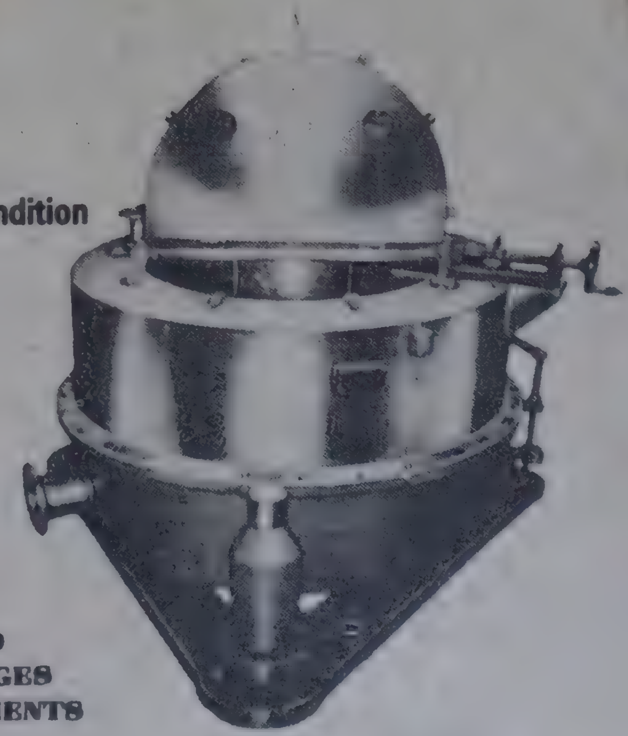


Fig. 3



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Application of Sodium Chlorate for the Pulp and Paper Industry

RAJIV PAREKH*

In the highly competitive pulp and paper industry today, ne prime objective is to produce high quality pulp at minimum cost. Sodium chlorate for bleaching can make a signifi-ant contribution for improving the quality of pulp and paper.

Sodium chlorate is used to produce chlorine dioxide which s a very powerful oxidizing agent uniquely suitable for pulp bleaching. It has the ability to produce high brightness pulp with little or no damage to the cellulose fibre. However, chlor-ne dioxide is also an unstable compound which must be highly diluted with air or water to prevent decomposition. Due to this reason, it is manufactured on site from sodium chlorate for large volume usage.

The chlorine dioxide can be manufactured by following processes:

1. Sulphur dioxide Reduction Process

This process requires sulphur dioxide to react with sodium chlorate in a dilute sulphuric acid solution.

Operation: Sodium chlorate and sulphuric acid are metered separately into the primary vessel of a two reactor system. The proper acid concentration is necessary for high efficiency and rapid rate of reactor. Sulphur dioxide, in air passes through diffusers on the bottom of generator. The amount of sulphur dioxide controls chlorine dioxide generation.

The air dilutes the chlorine dioxide and carries it to the absorption tower. Here the cold water absorbs the gas to form a solution. Sometimes the gases leaving the generator pass through a scrubber where sulphuric acid is removed.

The generated liquor overflows into the secondary reactor. Here most of the remaining chlorate reacts with sulphur dioxide in order to increase the overall yield of chlorine dioxide.

2. Methanol Reduction Process

The process requires methanol as the reducing agent to convert sodium chlorate into chlorine dioxide, sulphuric acid is also added to the solution.

Operation: Sodium chlorate and sulphuric acid are separately metered into number one reactor of a two reactor system. Generally the sulphuric acid is diluted and cooled prior to addition to reduce the heat. Methanol is metered into the reactor as a liquid to control the rate of chlorine dioxide production. It is necessary to use the correct amount in order to avoid chlorine generation.

Air passes through a plastic distributor plate at the bottom reactor. Air and chlorine dioxide flow to the absorbtion tower where a dilute solution is made after contact with cold water.

The generated liquor overflows to the number two reactor where more sulphuric acid, higher liquor temperature and additional methanol complete the conversion of chlorate to chlorine dioxide.

Bleaching with Chlorine Dioxide

Chlorine dioxide has rapidly gained favour as a versatile bleaching agent for pulp. Because of it's selective oxidising ability, chlorine dioxide either by itself or with chlorine is capable of producing high brightness, high strength pulp.

First Stage Sequential and Mixtures

Sequential bleaching involves the rapid reaction of unbleached brown stock with chlorine dioxide followed by chlorine both at low temperatures. Pulp washing follows before the pulp is treated at the extraction stage with caustic. Kraft pulp may also be reacted with chlorine and chlorine dioxide as a mixture in the chlorination stage. The usual chlorination operating conditions should be observed.

A reduced bleaching cost is generally achieved through lower over all chemical usage to reach target brightness. The pulp will show increased viscosity and less brightness reversion.

Chlorine dioxide increases the efficiency of pulp delignification in the chlorination stage and high substitution for chlorine offers marked advantages over low levels of substitution.

Oxidation Stages

It is common practice to bleach Kraft pulp with two chlorine dioxide stages. The effect on brightness development is shown with respect to the following.

Time: About 95% of the total brightness change is realised in the first half hour. About three hours are necessary as tower retention time to achieve optimum results.

---

* Managing Director, Shree Chlorates, Laxmi Niwas, 14/3, Manoramaganj, Indore 452 001.

Temperature: Increased temperature will produce a higher brightness pulp but a posititve residual of chlorine dioxide must remain to the end of the stage. If not, brightness reversion will take place.

pH: The pH of the solution dramatically affects the final brightness of the pulp. A high pH will not only lower pulp brightness but also degrade the fibres. A final pH around 4 is desirable on the first chlorine dioxide stage. Below pH 3, common high quality stainless steels are prone to accelerated corrosion. The second chlorine dioxide stage may vary from 5 to 7 without significant brightness change.

Safety: Sodium chlorate as a result of being a very powerful oxidising agent is a dangerous chemical and great care should be exercised in handling it. Sodium chlorate should not come in contact with any organic substance or sulphur, sulphates, ammonium compounds, phosphorous, cyanides, acids, metallic oxides and reducing agents of any sort.

Chlorine dioxide is similarly a very powerful oxidising agent. The decomposition of chlorine dioxide breaks down into chlorine and oxygen, generating heat and producing a greater gas volume thus causing a 'puff'. If concentration is more than 15% ClO_2 in air, then the puff may be quite violent. The causes of puff are due to the presence of any catalytic or reducing material entering a feed stream, like iron scale from piping etc. In such cases the chlorine dioxide wil continue to decompose until the contaminant is exhausted.

Apart from pulp bleaching, sodium chlorate is used with solid rocket propellants (through ammonium perchlorate), herbicides, defoilants (for soyabean crop), bleaching of oils, in the manufacture of perchlorates, uranium production etc.

ALLYL ALCOHOL
ALLYL CHLORIDE
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B.H.A./B.H.T.
T.B.H.Q.
BUTYL CELLOSOLVE ACETATE
SORBIC ACID
POT. SORBATE
DL MALIC ACID
CALCIUM PROPIONATE
CRESYLIC ACID
CELLOSOLVE ACETATE
CETYL/CETO STEARYL ALCOHOL
COCONUT DI ETHANOLAMIDE
  (IMPORTED)
CALCIUM CHLORIDE
CARBON DISULPHIDE
CAPROLACTUM
1,4 DIOXANE
CARBITOL/BUTYL CARBITOL
CARBITOL ACETATE
BUTYL CARBITOL ACETATE

CYCLOHEXANE
CYCLOHEXYLAMINE
D.B.T.O./D.O.T.O.
DI METHYL ACETAMIDE
DMDCS
ISO PROPYL ETHER
MONO DI TRI ETHANOLAMINE
MONO DI TRI ETHYL AMINE
ISO PROPYL AMINE 99%
ISO PROPYL MYRISTATE
  (IMPORTED)
E.P. 40/60 (IMPORTED)
ISO OCTANE 99%
N. HEPTANE 99%
H. HEXANE 99%
N. PENTANE 99%
ETHYLENE CHLOROHYDRIN
ETHYLENE DIAMINE
AMYL ALCOHOL
LITHIUM HYDROXIDE
LITHIUM CARBONATE
OLEYL ALCOHOL

NITRO METHANE
MOLY. DISULPHIDE
POT. CARBONATE
SOD. HYPOCHLORITE
  SOLN. (8 TO 10%)
SOLVENT NAPHTHA
  (LIGHT/HEAVY)
SOYA LECITHIN
  (INDIAN/BRAZIL)
T.H.F.
T.E.G. (INDIAN/IMPORTED)
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CALCIUM HYDROXIDE
  (EXTRA PURE)
TERT. BUTANOL
DISTILLED MEG
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WITH MODVAT

Chemical News from Abroad

CI REPORTS SHARP FALL IN IRST-HALF PROFITS

ICI reported an unexpectedly sharp all in first-half (H1) profits. Net income vas hit by extraordinary charges of £100m ($182m) to cover losses on the lisposal of the UK fertiliser business nd fell 34% to £372m on revenues up 3% to £6.8bn. Trading profits fell 20% o £734m and pre-tax profits by 21% to £33m. Finance director Alan Clements said the fall in pre-tax profits was accentuated by 'significantly' lower exceptional gains from disposals than last year.

At a press conference, the beleaguered-looking Denys Henderson described the results as 'disappointing'. In Q2, volume growth of basic products slowed, prices declined and costs rose. The major problem in Q2 was the month of June. Henderson said the results for April and May, while down on last year, were 'moderate', but those for June (usually a good month) — were 'poor'. This does not augur well for the Q3 results. As the other H1 results indicate, ICI is not the only chemical company suffering from the more difficult economic conditions. Henderson noted that in H1 the rate of growth in chemical production was lower than for industrial production generally.

In 1990, economic growth in both the UK and US was lower than ICI had envisaged, but growth in the other OECD countries was slightly better than expected, particularly in Germany.

The 3% advance in turnover was made up of a 4% gain from favourable currency movements and a 1% advance in selling prices, both offset by a 2% loss resulting from divestments. The currency impact on pre-tax profits was estimated by Clements to be £70m.

Looking at the sector breakdown, industrial products — the basic businesses of the company — reported the worst downturn. Trading profits were affected by a combination of poor demand, a more 'normal' and therefore less advantageous, supply/demand balance, additional capacity and hence poor pricing. ICI suggested the results of industrial products were returning to the more normal levels after two exceptionally good years. This is disappointing as it ignores the effects of inflation and the investment and cost-reduction measures the company has made in the intervening period. ICI is virtually admitting the group remains tied to the fortunes of the chemical cycle.

ICI six-month sales and trading profits (£m)

Sector	1990 Sales	1990 Profits	1989 Sales	1989 Profits
Pharmaceuticals	703	248	648	192
Paints	868	51	796	49
Other effect products	1237	57	1143	73
General Chemicals	1021	80	1031	170
Petrochemicals/ plastics	1453	88	1547	234
Fibres	388	28	341	24
Industrial Explosives	234	19	192	24
Agrochemicals and seeds	879	149	810	146
Fertilisers	433	2	468	15
Group Total*	6823	734	6642	914

*excluding inter-segment eliminations and others

Source: ICI

Several of the more specialist, and therefore supposedly more resilient, consumer and speciality product businesses, also registered problems. Films suffered from economic problems in Brazil and by poor pricing for oriented PP film. Polyurethanes suffered from weak demand in the US and Europe, although the market situation has improved recently. Growth in agrochemical results were held back by adverse weather.

Pharmaceutical profits advanced 29% as a result of an exceptional gain in Q1 and good growth in sales of the recently launched products, the Ace inhibitor Zestril, the anticancer drug Zoladex and the injectable anaesthetic Diprivan. ICI's paints business did well to increase profits, despite the difficult market conditions in the UK and US.

Trading profits reported by fertilisers fell 87% to £2m. The UK and Canadian businesses recorded losses in H1, while remaining activities in India, Australia and Malaysia operated profitably.

To remain competitive, Henderson said it was 'essential' the company improved its productivity. Depite the obvious short-term difficulties, ICI remains confident that it is pursuing the correct strategy. The only forecast Henderson would make was to say 'the next few months would be diffcult'.

TIGHTER MARGINS CUT DU PONT INCOME

Du Pont reported modestly lower net income for the second quarter, reflecting the weak US chemical sector and consequent pressure on margins. However, in comparison with other US chemical companies, results are tempered by the lower exposure of the group to the commodity chemical sector. Q2 net income declined 2.8% to $694m, on sales up by 4% to $646bn, against the same period last year.

Of the individual business segment, only Du Pont petroleum business, Conoco, reported an increase in net income, except coal, which was adversely affected by industrial action in 1989.

The industrial products segments reported net income of $135m on sales of $929m, a decline of 14.6% and 1.4%, respectively. Du Pont said this reflects lower sales of CFCs and increased expenditure on CFC alternatives.

Earnings in the fibres segment decreased 8.8% due to lower demand in apparel fibres, carpet fibres and nylon industrial yarn in several of the major markets. Net income for the division, including charges relating to the phase-out of Orlon acrylics business, was $157m.

Polymers declined 6.3% to $133m, due to restructing cost, partly offset by improved earnings in Europe and strength in the automotive refinish market, Du Pont said.

DOW EARNINGS FALL

Dow Chemical reported higher sales with lower than expected earnings for the second quarter as a result of weakening markets and higher manufacturing costs in its chemical and plastics businesses. Operating income was down 39.6% to $714m, on sales up 4.5% to $4.8bn, compared to the same period last year. Net income fell 50% to $364m.

Consumer specialities was the best-performing business segment, where operating income advanced 46% to $268m on sales up 48% to $1.3bn. A strong performance in pharmaceuticals and agrochemicals was recorded, with consolidated figures for the merger with Marion Laboratories and the agro chemical joint venture with Elanco included for the first time.

Chemicals and performance products posted sales of $1.2bn and operating income of $177m, down 12% and 63%, respectively, said to reflect lower prices, higher costs and lower plant operating levels. Sales of plastics were $1.8bn, down 3%, with operating income down 40% to $279m.

ICI RELINQUISHES UK FERTILISERS TO KEMIRA

ICI has made the first move towards rationalising its commodity chemicals business in Europe with the sale of the UK fertiliser business to Kemira. John Baker looks at the background to the move and its implications.

To watchers of either ICI or the European fertiliser market, the company's move to exit the UK fertiliser business — which it describes as 'a major step to reorganise its business portfolio in Europe' — came as little surprise. No real surprise either, that Finland's Kemira picked up a good deal of the business.

Like the other northern European player, Norsk Hydro, Kemira has been expanding its fertiliser business steadily over the last five years. The two companies now rank number one and two in the European market. Together, the three companies hold roughly 65-70% of the UK fertiliser market, with ICI the current market leader.

The remaining 30-35% is accounted f by imports from eastern and southe Europe, which have been rising stea ily over the last 10 years.

The market is worth som £600m/year ($1.1bn), but been plagu in recent years by falling demand, ove capacity, low prices — lower even th on the European mainland where son price inprovements have been possib recently — and the prospects of a co tinuing decline in size.

ICI is predicting a decline in the U fertiliser market of between 10-20 over the next five years, owing in larg part to European commission measure to reduce crop surpluses and limit nitr gen applications for environmental re sons. Kemira believes the decline wi be at the lower end of this range.

Giving its reasons for withdrawin ICI said it had concluded that 'its U fertiliser business is no longer viabl and that it lacked critical mass i Europe, where it has only a 5% mark share. It added: 'Despite actions i recent years to reduce costs and improv efficiency, ICI considers that furth rationalisation of both production cap city and the number of manufacture is essential for the European and U industry to return to even a modest sta of health'. Both Kemira and ICI mad losses on their business in the UK la year. ICI has made provisions of £100 in its first-half accounts for closing th business. Lack of profitability, said IC has meant that the massive investme needed to sustain competitiveness in th market has not been possible.

Impact of East European fertilisers exports to EC

Exporting country	1985 volume tonne	Market share %	1988 volume tonne	Market share %
Hungary	90,877	0.60	76,957	0.58
Poland	11,791	0.08	34,065	0.25
Romania	61,655	0.42	20,408	0.15
Yugoslavia	129,324	0.88	261,395	1.91

spite ICI's recent protestations that fertiliser operations were too closely egrated with the rest of its bulk chem- l operations to allow disposal, it has nd a workable solution for the with- wal. ICI will close its production nts at Billingham, Cleveland, and the sociated headquarters facility there. is involves the scrapping of a 500,000 ne/year ammonium nitrate plant, 0,000 tonne/year of granular com- unding capacity, and a 300,000 ne/year ammonia plant. In addition, ree nitric acid units will be closed. ICI ll, however, retain its newly expanded 0,000 tonne/year ammonia unit at illingham and two nitric acid units. hese will ensure feedstock supply for CI's polyamide and amines businesses, nong others.

The closures will mean the loss of 40 jobs and are expected to be com- leted by the first quarter of 1991. They ollow previous cutbacks in the business the past two years: closure of its mmingham site and rationalisation of ompound production and intermediates roduction. In the last two and a half ears, before the Billingham closure, CI has scrapped 1.3m tonne/year of fin- shed fertiliser capacity and 1.1m onne/year of intermediates capacity, vith the loss of 1100 jobs. Kemira is cquiring ICI's facilities at Severnside, ear Bristol, which includes two mmonia plants, facilities for ammon- um nitrate (AN) and NK production, nd a mothballed NPK unit, which says emira could be reopened for a small nvestment. The ammonia plants use CI's LCA technology, the rights to vhich are being retained by ICI. Kemira s also getting ICI's smaller facilities at eith, near Edinburgh, which comprise nitric acid unit and an NPK com- ounding unit. Also included is ICI's Chafer liquid fertiliser business, which has eight units in the UK and is cur- ently operated by ICI's subsidiary Britag Industries.

Some 540 of ICI's employees will ransfer to Kemira, including around 50 specialist staff from the closed Billingham HQ. ICI is currently in discussion with potential buyers for the Britag business, as well as several other smaller parts of its fertilier operation, including Scottish Agricultural Industries and the Liquid Carbon Dioxide and Drikold operations. ICI is keeping its Howden site which makes garden fertiliser products. The ICI assets acquired will add some 1m tonne/year to Kemira's UK capacity, giving it the market leadership. The company has two ammonia plants in the UK, one at Ince, near Chester, and one at Hull. In addition, it has nitric acid, AN and granular compounding at Ince. Other facilities are located at Saxilby, Lincoln (bulk blended fertilisers), and Sharpness (NPK and PK blended compounds). Kemira also has a facility in Hillsborough, Northern Ireland, for bulk blended NPK fertilisers.

According to John Davies, managing director of Kemira Ince, the acquisition reinforces Kemira's committment to both the UK and European fertiliser markets. The company is already Europe's number two, with a fertiliser capacity of some 8.5m tonne/year. Around one-third of group sales of £1.7bn in 1989 came from fertilisers. Commenting on the rationale behind Kemira's decision to buy the ICI business, Davies said that he anticipated there would be significant operating synergies, adding, "I believe the business in the UK can be profitable'. The acquisition will enable Kemira to roughly double its UK sales of fertilisers without increasing its sales and administration overheads proportionately. The company anticipates some rationalisation of distribution arrangements and lower distribution costs now that it has three main production sites, rather than one. Davies admits, however, that he expects to lose some of the sales Kemira will acquire from ICI.

Expanding on the operating synergies, Davies explained that ammonia for the Leith site would be available from Hull, while the Ince site, which is currently short of ammonia, could now source from Severnside. As a result of the acquisition, Kemira's UK operation will be in a position to send ammonia to other company sites in Europe. The removal of the Billingham capacityaccounting for 15-20% of UK production, will allow Kemira to run its plants at full capacity, thus gaining operation cost advantages. In European terms, however, the rationalisation will have only small effect. There still remains a structural problem in the European fertiliser industry and further rationalisation must surely be on its way.

NO EC ACTION ON NPK IMPORTS

Despite the problems facing the European fertiliser industry, the European Commission has halted antidumping proceedings against NPK fertiliser imports from Eastern Europe. The move follows the decision by CMC Engrais, the federation of European fertiliser manufacturing associations, to withdraw a complaint lodged with the Commission last year. CMC Engrais lodged its complaint with the Commission in 1989, alleging evidence of dumping and of material injury associated with imports from Hungary, Poland, Romania and Yugoslavia. Accordingly, the Commission started antidumping proceedings and investigations. Evidence available to the Commission showed that during the investigation period prices of the alleged dumped imports were, on a weighted average lower by about 20% than those charged by EC producers.During the same period, EC NPK production fell 8.9% from 8226 295 tonne in 1985 to 7534 456 tonne in 1988. Capacity utilisation rates rose from 82.9-85.9% as EC production capacities declined from 9921,000 to 8242,000 tonne. While EC producers saw sales rise 7.5% from 5446,258 tonne in '85 to 5858,928 tonne in '88, both prices and profitability declined in the same period. Prices dropped between '85 and '87 to recover slightlyin 1988.

Biotechnology

GLAXO SEALS FIRST R & D COLLABORATION WITH GILEAD

Glaxo has formed a research collaboration with a US genetics company, Gilead Sciences of Foster City, California to develop new anticancer drugs by exploiting new developments in the field of molecular genetics. The $20m deal will offer the UK-based company the chance to become pre-eminent in the emerging field of genetic targeting.

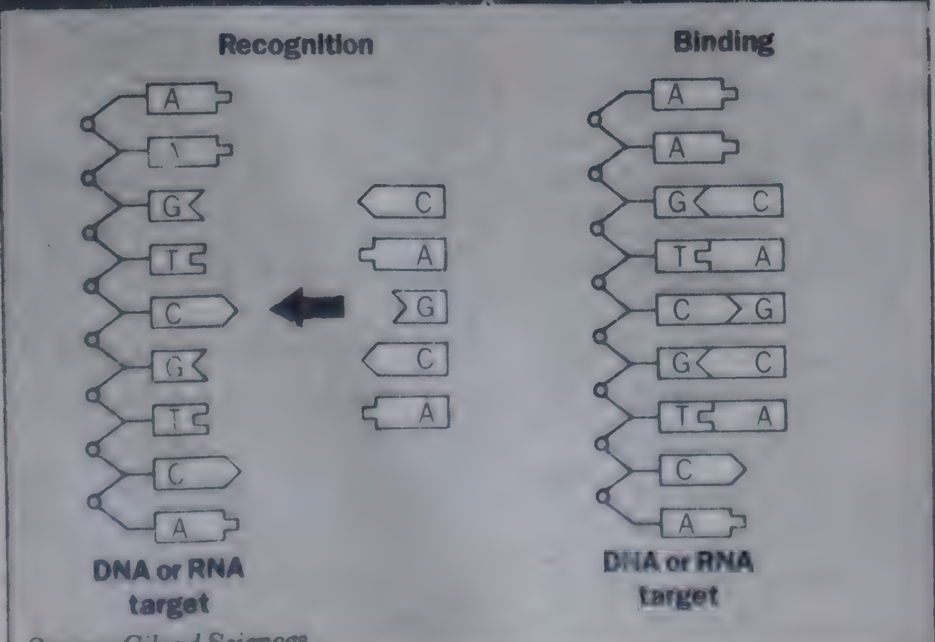
The deal is the first of its type for Glaxo, which, in contrast with most other research-based pharmaceutical companies, did not form research collaborations in the comparable biotechnology arena. Glaxo will support research for an initial five-year period and take a minority stake in the company. The agreement allows Glaxo exclusive worldwide rights on anticancer agents, but does not preclude either party utilising developments in other therapeutic areas.

The research work will centre on finding therapies for slow-proliferating, solid tumour cancers, such as colorectal, lung, breast and prostate diseases. Often, these cancers do not respond to the antiproliferative cytotoxic agents currently available, such as Cisplatin, which attacks rapidly dividing cells. Current treatment usually includes surgical intervention, but problems can occur when metastasis, spreading of the tumour, occurs.

Genetic targeting is the use of therapeutic agents to selectively inhibit disease-causing genes, by way of their base sequence. The idea is to synthesise small DNA-like molecules (chains of amino acids) called oligonucleotides or 'oligos', which can enter the DNA of cancerous cells and prevent them reproducing. Gilead's president and ceo, Dr. Michael Riordan, says that for an oligo to be specific to a particular mutated gene, it needs to be 12 bases long. To cover every gene in the body, 15 bases are required.

According to Dr. Richard Sykes, Glaxo's research and development director, the main tenet of genetic targeting is the ability to discriminate between nontumour and tumour tissue. This, and the hypothesis that oligos can prevent cell proliferation is tested 'beyond doubt, he believes. Sykes believes genetic targeting to be a very exciting area of modern science with immense potential. It offers a technique which could be used as a preventative in individuals predisposed to developing cancers, rather than just treating the disease, he adds.

Genetic targeting



Source: Gilead Sciences

Synthetic oligonucleotide analogues can bind to either the messenger RNA (mRNA) or the DNA of the cancer-causing gene, with both ways preventing the DNA expressing the protein which it normally encodes. Thus, it can be seen that genetic targeting differs from other areas of medicine such as gene therapy (which offers the potential to insert replacement genes) and the diagnosis of defective genes.

Only one of the two strands that compromise DNA, is copied to form the RNA that, in turn, marshals amino acids into the right sequence to make a specific protein. This is called the 'sense' strand. Small parts of the other, 'anti-sense' DNA strand can be made by scientists synthetically and can be used to render RNA impotent by binding to it specifically and preventing protein synthesis. Another route to therapeutic agents involves modified oligos that bind directly to double-helix shaped (double-stranded) DNA, rather than the single-stranded) RNA.

Genetic targeting has only emerged as a viable concept through recent advances in molecular genetics. Specific genes implicated in viral diseases and certain forms of cancer have been identified and their base sequences determined. In addition, the first potential gene-targeting therapeutic agents, synthetic oligos, have only recently come within reach of organic chemistry.

Since oligonucleotides are much smaller, typically 12 bases long, they are closer to conventional pharmaceuticals than proteins.

Despite this, there are large differences between a chemical that inhibits a gene's action in vitro and a medicine Glaxo point out.

Among the considerable hurdles yet to be overcome are:

Binding

The oligo must exhibit a high degree of selectivity, that is, it must recognise and bind to the correct gene sequence and no other.

Solubility

The new drugs have to be sufficiently soluble in water to be transported around the body and in lipids to be able to enter cells.

Stability

The oligos must be able to resist digestion by enzymes, if they are to reach the gene target intact.

Sykes suggests the researchers may have to look at extracellular targeting agents, such as monoclonal antibodies, to effciently deliver the oligos to the tumour site. Another problem to be overcome is how to increase the permeability of the cytoplasm of the cell, so that sufficient oligos reach the nucleus. Mutated genes that cause cancer, or oncogenes, have already been identified in a number of solid tumours. Two years ago, Glaxo assembled a unit producing transgenic mice, which develop particular cancers. These so-called 'oncomice', can be used as models for the preclinical trials and, to date, Glaxo has developed lines expressing colo-rectal,breast and prostatic cancers.

Since Gilead's formation in 1987, it has been actively building up intellectual property in genetic targeting techniques. According to Gilead's chief financial officer, Michael Bigham, funding has been by venture capital investment of $12m. 'Our success in attracting investors has brought other entrants into the field', claims Bigham, 'but we have a head start on them'. If, as Gilead's Riordan believes, genetic targeting will open up a third generation of pharmaceuticals, following biotechnology and the traditional empirical screening techniques, Glaxo, again, looks set to reap the rewards.

DU PONT-MERCK VENTURE REFLECTS MERGER PRESSURE

Du Pont's decision to rationalise its pharmaceutical operation into a 50:50 joint venture with Merck, to be called Du Pont-Merck Pharmaceuticals, was prompted by the realisation that its existing pharmaceuticals business did not have the 'critical mass' to commercialise its R&D portfolio alone.

The new partnership, which will create a separate company, is planned for January 1991, pending negotiations of definitive agreements and regulatory approvals. It will comprise Du Pont's entire pharmaceutical and radiopharmaceutical imaging agent business, with Merck providing development funds, marketing rights to several drugs, industry experience and cash. Du Pont's other healthcare divisions, diagnostics, biotechnolgy and X-ray products are not included in the new company.

The deal will therefore allow Du Pont access to enhanced marketing and development capability and in return, Merck can exploit Du Pont's pharmaceutical research.

Du Pont's objective has been to develop a global integrated research-based pharmaceutical company, says Ken Kasses, director of business development in Du Pont's medical products division. However, the business could not develop organically at a sufficient rate to remain competitive. Kasses told ECN that a partnership was the best way to expand the business in Europe and advance products in the development stage.

Du Pont's decision reflects the links already forged with Merck — the two companies entered a research/marketing agreement in last October — and Merck's pre-eminent position in the pharmaceutical industry, says Kasses. It is understood that Merck, however, chose not to buy Du Pont's business outright, because of the high cost of acquisitions.

Drugs currently marketed by Du Pont and transferred to the partnership include: Coumadin, an anticlottin agent; Hespan, a plasma volum extender, the analgesics Percodan an Percocet; a thallium imaging agent; an the recently approved anti-arrhythmi Ethmozine. Merck will provide the venture with certain marketing rights to th anti-Parkinsonian agent Sinemet and th combination diuretic Moduretic, fo treating hypertension, in West Germany France, Italy, Spain and the UK. D Pont gained marketing rights to th latter two drugs in the US, under the earlier agreement in return for rights to D Pont's angiotensin II (AII) recepto antagonists.

In addition, the venture will marke Proscar, a compound under phase II development by Merck for treating enlarged prostate gland, in those same European countries, once it gains the regulatory approvals, expected by 1993

Currently, Du Pont funds development in four therapeutic categories: cardiovascular, anti-inflammatory oncology and Alzheimer's disease Much of the work is still at the early stages, and therefore requires progressively greater investment to bring to market. Indeed, both companies anticipate the new company will not reap returns until the late 1990s.

Du Pont's main research compounds are the AII receptor antagonists, a potential new class of hypertensives, DuP 996, a compound with potential to treat Alzheimer's disease and memory impairment and DUP 785, in phase II, an anti-cancer with immune supression properties.

Du Pont-Merck Pharmaceuticals will have a research staff of 1,500, and R&D budget of $230m and a professional sales staff of 600, in the first year of business. This ranks the company about 28th in worldscale terms of R&D expenditure and manpower. Sales estimates of $700m would put the venture about 50th in terms of pharmaceutsales, a similar level to that of ns. Currently sales are $550m, ever, the business does not return ofit because of the comparative high l of high R&D expenditure. Even rojected (1991) levels, R&D expen- re would still be over twice the stry average (currently about 14% ales). The securities firm Shearson man Hutton believes the Du Pont- ck partnership is symptomatic of solidation in the pharmaceutical ustry. Earlier this year, SLH pre- ed a further wave of drugs company rgers, as it calculated pharmaceuti- companies could not maintain the rent levels of R&D expenditure and vide an adequate return to their estors.

TI-CHOLESTEROL DRUG JV BRON

ritish Bio-technology (BB) has set a research collaboration with the Jap- se company, Japan Tobacco (JT), to elop a novel synthetic type of cho- terol lowering agents, HMG CoA uctase inhibitors. The agreement re- ces an earlier one, under which BB l been developing drugs with McNeil armaceutical, a Johnson & Johnson osidiary, for approximately three ars. This was terminated four months , when McNeil reorientated its earch priorties. Under the terms of new research collaboration, BB retains rights to market any drug stemming from the research outside Japan. The research is understood to be at the point of selecting a candidate compound for clinical trials. In contrast of existing drugs in this class, BB's lead compounds have been chemically synthesised as opposed to being byproducts of fermentation. BB believes this allows it the flexibility to 'build in' exactly those properties required of the drug consequently offering a route to a better therapy.

JT, a stock company fully owned by the Japanese Government, has been diversifying into pharmaceuticals, agribusiness and engineering. The company bought a stake in BB in May 1989.

UK SAYS NO TO MONSANTO'S BST

The UK Veterinary Products Committee 'does not believe Monsanto's bovine somatotropin (BST) product is ready for a commerical licence at this time', according to a statement issued by the company. The VPC, an independent advisory committee of the Ministry of Agriculture's Veterinary Medicines Directorate, reviewed an extensive dossier of data on several years' trials of the genetically engineered hormone. According to Monsanto it found that 'a few issues of concern remain'. Areas of concern are associated with the pharmaceutical process conditions of full, commercial-scale production, together with 'some specific aspects of animal safety', according to the company. Full details are expected to the released after the committee's next meeting, scheduled for September.

However, the VPC found that BST 'posed no risk to either human safety or the environment', Monsanto reports. 'It is also satisfied with the claims of prodce efficacy demonstrated by the trials'. When further details on the VPC's preliminary recommendation are available, Monsanto plans to make use of the Medicines Commission appeal procedure to provide adequate data and reassurance on process conditions to resolve the remaining concerns'.

Monsanto's director, animal sciences division, Europe and Africa, Robert Deakin acknowledged that the VPC has already challenged Monsanto extensively on the registration dossier, which is 'one of the most complex for any product ever submitted to the VPC'. Before it can be sold in EC member states, BST must be approved by the EC's Committee for Veterinary Medicinal Products (CVMP). A decision from this committee is currently awaited. Monsanto's BST product has already been licensed for use in seven countries —the USSR, Czechoslovakia, Bulgaria, South Africa, Namibia, Mexico and Brazil.

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Environment

NRA PROPOSES TIGHTER UK RIVER DISCHARGE CONTROLS

The UK National Rivers Authority (NRA) has published proposals aimed at achieving tighter control of effuent discharges to inland and coastal waters. In Discharge Consent and Compliance Policy: a Blueprint for the Future, the NRA makes 33 detailed recommendations to alter the current 'unsatisfactiory' system by which 'consents' are granted for discharges. These consents set obligations on discharges and limit discharges into water; it is illegal to discharge toxic or polluting substances without one.

Currently, a company cannot be prosecuted unless 5% of discharges, taken over a year, break licence conditions. Under the proposal regulations, prosecution could take place if a single sample failed.

'Central to the success of the new arrangements would be greater involvement of discharges in pollution prevention', the NRA states. A key recommendation of the report is for absolute limits to be set on effluent flows and concentration for all environmentally sensitive discharges. It would be an offence to exceed these limits.

Under the NRA proposals, controls on sewage works and on other industries would be placed on an equal footing, bringing to an end the anomaly, which currently allows sewage treatment works to operate on only 95% compliance with their consents.

'If the NRA is to gain the confidence of the public as a licensing body for discharging waste, it must have the means to control the absolute concentrations and the total amounts of substances discharged', according to NRA chief scientist, Dr. Jan Pentreath. 'It also needs to be able to insist that monitoring is rapid — even automatic — and meaningful; he said.

As part of its strategy of making discharges more actively involved in pollution prevention, the authority plans to ask corporate business to designate named managers at their sites who would be accountable for the 'good operation of discharges'. There would also be a legal requirement that the NRA be told of any changes in the circumstances of discharges not sampled regularly. Data would be required by the authority to prove that maintenance obligations were being met.

A further recommendation of the report is that there should be more widespread use by dischargers of 'continuous and automatic monitoring of environmentally significant discharges'. The equipment used for this would need to be checked by the NRA, which would 'where necessary, specify the provision of remote access equipment'. This would not, however, replace the need for independent NRA monitoring and sampling, which would be required by law to bring a successful prosecution.

A new method of enforcing the NRA's regulations would be the proposed 'action warnings', which would be issued to discharges when urgent action was needed to prevent legal limits from being exceeded.

TOUGH TERMS FOR SANDOZ PLANT

Eire's National planning board's goahead for the Punt 170m ($102m) Sandoz plant is subject to some of the most stringent conditions ever imposed on an industry in the country. The plant is to be built at Ringaskiddy, County Cork.

The tough conditions attached to the planning permission, running to 34 pages, reflect the concern voiced by the local community, which has been supported by Eire's junior environment minister, Mary Harney. The planni board has imposed a zero limit dioxin emissions; and insisted that t company prepares a waste reducti programme and gives a progress rep on its achievements each year.

In all there are 69 conditions co tained in the air pollution licen granted by the board. Extensive testi of the two incinerators at the propos plant must be carried out before produ tion can begin. And for the first time Eire, under the terms of the plannir permission, the public will have th right to enter the plant while it is in op ration to check that the conditions s out by the board are being observed

The board's decision, which followe a lengthy public inquiry into the projec surprised even local environmentalis with its toughness. But a spokesman fo the Cork Environmental Alliance, th main group of objectors, refused to rul out an action in the Irish High Court t try to have the planning permissio reversed. She said: "The issue is sti being considered by our legal team"

ECOVINYL NEARER

Wheaton Plastic Recyling Co. o New Jersey has modified its Millvill recycling facility to enable it to grin and wash post-consumer polyviny chloride (PVC) bottles. Material i being supplied by Oxychem.

The company, a division of Wheato Industries, has to date processed mainl post-consumer high-density polyethylene (hdPE), which floats on water. The modifications to the Millville plant will allow recovery of clean PVC, which sinks. In addition, the drying system capability has been debottlenecked to a process capability of some 6350 tonne/year. The modification was needed for Wheaton Plastic Recycling to follow its speciality processor strategy, according to its general manager, George P. Glenn.

With the availability of recycled VC, Oxychem (which is working with Vheaton on this project) moves a step loser to commercialising its new line f 'recycle-containing' PVC comounds, trade-named Ecovinyl. The first roducts from this line will be targeted t the bottle market; technical developnent of these products is 'well undervay'.

UK INSTITUTE WILL ASSESS ENVIRONMENTAL REPORTS

Laporte, Unilever and BP have joined three other major UK concerns to establish an Institute of Environmental Assessment 'to set professional standards for environmental consultants and a firm independent reference point for environmental advice'.

Since 1988 and the adoption of EC directive 85/337, environmental assessment has been a legal requirement at the design stage of many projects. Recent studies, say the IEA, have been shown that up to 50% of advice given in these environmental reports does not meet the needs of proper environmental protection.

The three companies, together with Anglian Water, Commercial Union and European Land, have provided £60,000 ($108,000) to set up the Institute, based in Grantham, Lincolnshire. Dr. Tim Coles, an environmental scientist, has been made executive director and secretary.

The IEA will be a membership-funded, nonprofit-making organisation with three goals: to establish a register of competent consultants; to offer environmental advice; and promote best practice environmental techniques.

'The problem of variable quality advice lies with a lack of any professional accreditation system', notes Dr. Coles, 'and partly with incorrectly defining the scope of assessment reports. The establishment of a professional institute will help resolve many of these problems'.

In its registration role, the UK institute hopes to operate on similar lines to the existing Dutch organisation, the Environmental Impact Assessment Commission, based in Utrecht. Environmental statements will be audited by a group of independent scientists to see if they meet quality standards. Membership of the institute will be open to corporate bodies only, including industry, consultancies, government agencies and regulatory bodies, and planning authorities.

POTASH MINES FOR TOXIC WASTE

Plans are underway in France to turn the country's only operative potash field into an underground storage facility for toxic waste. The field, which is located some 15km northeast of Mulhouse, has only a short remaining life. The two mines there are worked by Mines de Potasses d'Alsace (MDPA).

MDPA, a subsidiary of state-owned Entreprise Miniere et Chimique (EMC), has already planned conversion of the underground galleries, which lie at depths of 400 to 1,100m and cover some 20,000 hectares. Waste would be taken from the Rhine valley area. Excluded from the project are liquid and radioactive wastes as well as explosives.

Louverens Medemblik, head of one of the mines, said that local authorities and environmental associations had already been informed of the project and there had been little opposition. An official brief will be submitted by the end of the year and a public enquiry held, which should take about a year to complete. To be viable, said Medemblik, the project would have to start with a storage capacity of 10,000 tonne/year. This would require a workforce of around 30 people.

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News about New Projects

DSM STUDIES ETHYLENE, PE EXPANSION AT GELEEN

DSM is studying a major expansion of its Geleen site in the Netherlands, which would include a significant increase in ethylene capacity and two new polyethylene units.

The company is assessing expansion of its Lummus-designed No 4 naphtha cracker to 775,000 tonne/year. The additional ethylene output would be used captively as feedstock for two associated polyethylene units at the same site: a conventinal low density polyethylene unit and a swing high density/linear low density unit are proposed. No decision has been taken on capacities, however.

A polypropylene plant, to take the additional propylene output, could be added in 1994 or 1995. Work is currently underway on a 40,000 tonne/year debottlenecking of the No 4 cracker, which is set to raise combined ethylene and propylene capacity to 505,000 tonne/year by late 1990 or early 1991.

DSM is now assessing implementation of Stone & Webster's advanced recovery system (ARS) technology for further expansion to 775,000 tonne/year. Stone & Webster, which has recently completed a feasibility study on the proposed expansion, claims ARS would offer lower investment costs than an equivalent grassroots plant.

DSM says it expects to take a final decision this September. The polyethylene units would only go-ahead if the ethylene expansion is approved. DSM currently produces 600,000 tonne/year of polyethylene and 280,000 tonne/year of polypropylene at Geleen.

KORUMA EXPANDS CHLOR-ALKALI

As a first step following acquisition by Santral Holding, Turkey's Koruma Tarim Ilaclári is to increase its chlor-alkali capacity by 25%. A major 50,000 tonne/year chlorine expansion is planned to follow.

The initial $1.2m expansion, which corresponds to 6,000 tonne/year of chlorine and 6,750 tonne/year of caustic soda, will be achieved by the addition of four mercury cells into the existing cell room. De Nora has been appointed contractor for the work, which is expected to be completed by November.

The company's major chlor-alkali investment will be in membrane technology. A first phase will comprise installation of electrolysers to produce 25,000 tonne/year chlorine.

These will operate alongside the existing mercury system. At a later date, chlorine capacity will be raised to 50,000 tonne/year. A technology licensor and contractor have yet to be selected.

BP UPS FRENCH PE

BP Chemicals SNC (Societe on Nom Collectif), the French arm of BP Chemicals, is to invest over FF300m ($54.9m) in expanding its polyethylene production at Lavera, southeast France.

The major part of the investment will be used to increase the capacity of the two-gas phase lldPE/hdPE production units from 165,000 to 230,000 tonne/year by the third quarter of 1991.

Of the two units, PZ4 currently produces 120,000 tonne/year and PZ3, 45,000 tonne/year. The balance of the investment will improve the production range and costs and build an improved pilot plant.

Additional ethylene feedstock will be available by mid-1991 through expansion of the Lavera steam cracker operated by Naphtachimie, BP Chemicals' 50/50 joint venture with Atochem. Ethylene capacity is currently bein increased from 520,000 tonne/year, t 670,000 tonne/year of which 50% wi go to BP.

DOW/PASA SIGN ARGENTINA P JV

Dow Chemical has signed a letter c intent with PASA Petroquimica Argentina to set up a 50:50 joint ventur polystyrene plant at PASA's existin complex at San Lorenzo, Santa Fe.

Preliminary plans call for a 20,000 tonne/year plant, based on Dow technology, to be onstream by 1993. Outpu will serve both the domestic and expor markets.

Feedstock will be supplied from PASA's styrene monomer plant at San Lorenzo, which is currently being expanded from 82,000 to 170,000 tonne/year as part of the company's previously announced $120m expansion at the site. Most of the additional capacity will be exported.

PASA already has a small 8,000 tonne/year polystyrene manufacturing facility at its Estirenos plant in San Luis. The company also produces around 50,000 tonne/year of styrene butadiene rubber and 2,000 tonne/year nitrile butadiene rubber.

PASA says it is negotiating with the International Finance Corp and other banking institutions to raise necessary finance for the San Lorenzo projects, which also include revamps of benzene, ethylene and ethylbenzene. Rodoldo Dietrich, PASA's planning and development manager, confirmed the selection of UOP technology for the 70,000 tonne/year benzene revamp.

Dow Chemical, with a current worldwide polystyrene capcity of 1.4m tonne/year, is also negotiating a joint venture plant at Pequiven's El Tablazo complex in Venezuela.

OLVAY AWARDS JOHN ROWN ANTWERP PE/PP ONTRACTS

John Brown is to design and build olvay's grassroots polypropylene and igh density polyethylene plants in illo, near Antwerp, Belgium. The ultimillion dollar contract is the first warded to John Brown by Solvay.

Under the contract, John Brown will rovide the enginnering, procurement nd construction management services or both plants. The work will be car-ied out on a fast-track schedule in the contractor's Netherlands office. Con-truction is expected to start by the end f the year.

Solvay expects the hdPE plant to come onstream early next year, with the PP plant taking 'a little longer'. John Brown says both plants are scheduled for completion by the fourth quarter of 1991. The 100,000 tonne/year hdPE plant design will be based on proves Solvay/Phillips technology, adding to Solvay's current worldwide hdPE capacity of around 900,000 tonne/year.

A spokesman for Solvay said the company is looking to raise hdPE capacity further, to 1.16m tonne/year, though no decision has been taken on timescale or location. The company has European production at Sarrlebe, France, and Rosegnano, near Livorno, Italy. It also operates a plant at Deer Park, Texas.

The 80,000 tonne/year PP plant at Lillo will use the gas phase fluid bed Unipol process licensed from Union Carbide/Shell Oil (USA). It will add to Solvay's existing 380,000 tonne/year PP capacity at Sarrlebe and Deer Park. The units form part of Solvay's major investment programme at the Lillo site.

The company currently produces chlorine and caustic soda at the site. A 250,000 tonne/year ethylene dichloride plant, under construction by in-house engineers, is due onstream by the end of the year.

AMOCO UPS ETHYLENE USING ARS

Amco Chemical is to expand capacity of its ethylene cracker at Chocolate Bayou, near Alvin, Texas, using Stone & Webster's advanced recovery system (ARS) technology. The $200m expansion, set for completion in early 1994, will increase ethylene capacity by about 272,000 tonne/year and propylene capacity by around 91,000 tonne/year. Current capacities are 1.1m tonne/year and 364,000 tonne/year, respectively.

While Stone & Webster has carried out over 20 feasibility studies for ethylene revamps using ARS technology, and is implementing it in a grassroots ethylene plant in South Korea, the Amoco project will be the first major ARS expansion to go ahead.

'The technology allows the full capacity increase desired by Amoco to be achieved by modifying a single unit', claims Stone & Webster, which is pleased to have the technology, 'endorsed by a major ethylene player'. It is the first time Stone & Webster has worked with Amoco on an olefins project. The cracker was designed by Braun and built in the mid-1970s.

The expansion follows Amoco's deferral of a previously announced 680,000 tonne/year grassroots ethylene facility which was to be built at a US Gulf coast location by M.W. Kellogg by 1992. While an Amoco spokeswoman said the company was still studying the proposal, industry sources say the plant is unlikely to be built.

The expansion will allow Amoco to maintain a strong position in the US Gulf coast merchant ethylene market. The additional propylene output will be used as feedstock for Amoco's recently announced 136,000 tonne/year polypropylene unit to be built at the same site.

Stone & Webster is also carrying out a feasibility study to expand the Noretyl ethylene cracker at Bamble, on Norway's southern coast, using ARS technology.

The Linde-designed plant, operated by the Norsk Hydero-Statoil joint venture, has a current ethylene capacity of 400,000 tonne/year. Expansion to 530,000 tonne/year is being considered.

Meanwhile, a similar feasibility study on expansion of the 300,000 tonne/year ethylene cracker operated by Neste Chemicals' Portuguese subsidiary, Neste Productos Quimicos, at Sines is coming towards the end of the first phase.

The company is considering an expansion of the Linde-designed plant to around 440,000 tonne/year using ARS technology.

Alternatively, it may opt for a modest investment in conventional debottlenecking, increasing capacity by only 10-15%. A decision is expected before year end.

B & RB WINS TiO$_2$ DEAL

US contractor Brown & Root Braun has been awarded phase I engineering for Kerr-McGee's recently announced 60,000 tonne/year grassroots domestic titanium dioxide plant. The contract includes plant design, preliminary engineering and cost estimating to set a target price and project schedule by next April. Plans call for the unit to be onstream by late 1992 or early 1993. Kerr-McGee says the site evaluation process is still continuing, with three sites under consideration. One possibility is Hamilton, Mississippi, where the company already produces 106,000 tonne/year of titanlum dioxide. The plant will use Kerr-McGee's own chloride process.

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MARKET INFORMATION

Vam, Maleic Anhydride up

Prices of vinyl acetate monomer and maleic anhydride firmed up to Rs. 55 and Rs. 42 respectively, following a revision in prices by leading manufacturers. Hydrogen peroxide was in short supply and little material was available at Rs. 39/-.

NOCIL's unscheduled closure has created serious shortages of most solvents and prices of Butanol, Cellosolve, Polyethylene Glycols, Triethanolamine have firmed sharply.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent – and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

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Ammonium chloride	3.25
Ammonium nitrate	6.00
Arsenic white powder	22+ST
Acrylamide (Resale)	85.00
Barium carbonate	20.00
Bleaching powder (33% Cl)	5.00
Borax (Granular)	16.00
Borax (Powder)	22.00
Boric acid (Tech)	32.00
Bisphenol-A	75.00
Butyl carbitol	106.00
Caustic soda (Flakes)	11.00
Caustic soda (Solid)	12.00
Caustic soda (Lye)	10.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	6.00
Calcium carbonate (Activated)	5.75
Cobalt oxide	550.00
Cresylic acid	62.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.) China	70.00
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Bombay Office: Amrit Niwas, 3rd Floor, 159/2, Cavel Cross Lane No. 6,
Kalbadevi, Bombay 400 002.
Phones: 292081/258697 Telex: 011-5394 ANUJ IN (SHC)
Works: A/8, M.I.D.C., Mahad, Distt. Raigad.
Phone: 2711/2713

ETHYL CELLOSOLVE * ETHYL CARBITOL
TRICRESYL PHOSPHATE * CELLOSOLVE ACETATE
BENZYL ACETATE FFC * BENZYL ALCOHOL FFC
SODIUM BI-SULPHATE * POTASSIUM BI-SULPHATE
METHYL CELLOSOLVE ACETATE
TRI PHENYL PHOSPHATE

For Your Requirement Please Contact:

trade link

5/363, Mangaldas Building, Trikamji Ghia Marg, 2nd Floor, BOMBAY - 400 002.
Phone: 297718/259487; Resi: 473310 Gram: 'POLOSIGHT' Telex: 4258 PTK IN

Bombay Dyes Market

(Prices as on September 10, 1990)

CID COLOURS	Per Kg.
cid Violet 4BS	*190.00
cid Maroon V	110.00
cid Orange II	112.55
cid Orange IIY	93.85
cid Red A	137.00
cid Scarlet 3R	128.35
cid Red 38N	*195.00
cid Red R2R	132.00
cid Red RS	88.00
cid Patent Blue AS	*280.00
cid Green V	*375.00
cid Coomasi Blue	200.00
cid Yellow 5GN	65.00
cid Red PG	85.00
cid Red GRS	78.00
cid Black 10 BX	157.15
cid Black BX	126.95
cid Black Wax	135.50
rosein Scarlet MOO	200.30
rocinil Yellow GS (ICI, UK)	265.00
rocinil Red GS (ICI, UK)	530.00
rocinil Blue RS (ICI, UK)	315.00
rocinil Scarlet G (ICI, UK)	600.00
rocinil Orange G (ICI, UK)	250.00
rocinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.83
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc.	611.50
Red B 2B Conc.	797.90
Red CB Powder	1048.25
Red D2B Powder	580.65
Violet C 4R	1202.70
Blue BG Powder	580.65
Blue BN Powder	128.25
Blue D 2R Powder	588.25
Navy BT Conc.	531.95
Blue B 2G Conc.	577.95
Blue BT Conc.	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60
Red 2B	422.40
Red FB	425.80
Red Violet FBL	622.00
Orange 3R	254.20
Violet 3R	370.50
Violet RL	355.70
Violet 6R	638.20
Scarlet RR	283.50
Rubine 3B	289.10
Rubine CB	449.50
Blue GL	419.00
Blue BGF	805.80
Navy Blue RE	359.90
Brown 3REL	272.80
Black GEL	420.10
Dark Brown 3B	411.10

BASE COLOURS	Per Kg.
Fast Yellow GC	77.75
Fast Orange GC	128.40
Fast Scarlet R	198.05
Fast Scarlet RC	128.40
Fast Scarlet RCR	105.60
Fast Scarlet G	115.75
Fast Scarlet GN	92.95
Fast Scarlet GG	77.75
Fast Scarlet GGS	73.95
Fast Red B	233.50
Fast Red RC	115.75
Fast Red R Flakes	158.80
Fast Red TR	181.60
Fast Red TR Oil	223.35
Fast Red RL	251.20
Fast Red KB Oil	251.20
Fast Bordeaux GP	236.00
Fast Garnet GBC	103.05
Fast Violet B	548.80
Fast Blue BB	566.50

NAPHTHOL COLOURS	Per Kg.
ASG	301.85
AS	205.65
ASSW	379.10
ASBS	253.75
ASBO	266.40
ASD	209.45
ASOL	243.60

ASTR	369.00
ASPH	336.05
ASE	236.00
ASEL	249.95
ASLB	2,002.35
ASBT	2,459.45
ASWG	143.00
ASSG	538.65
ASSR	652.60

PROCION COLOURS	Per Kg.
Golden Yellow HR	207.95
Brill. Yellow H4G	145.65
Supra Yellow H-8GP	168.55
Brill. Yellow HE6G	214.75
Yellow G-E4R	276.05
Brill. Yellow H7G	332.30
Yellow M4R	275.45
Yellow M GR	387.65
Brill. Yellow M4G	201.15
Brill. Yellow M8G	366.10
Yellow M 3R	244.70
Brill. Orange H 2R	303.80
Brill. Red H 7B	157.95
Brill. Orange M 2R	313.15
Brill. Red H 8B	213.55
Brill. Scarlet H RN	245.05
Supra Red H-3BP	179.80
Brill. Red H-F3B	243.45
Brill. Magenta HB	182.00
Brill. Red M 5B	160.05
Brill. Red M 8B	218.35
Brill. Pink MB	137.10
Brill. Magenta MB	163.65
Brill. Purple H-3R	219.55
Brill. Purple H-7R	175.40
Navy Blue H 3R	333.75
Brill. Blue H-GR	406.40
Brill. Blue H 5G	207.95
Blue H 5RX	286.20
Brill. Blue H 7G	213.95
Brill. Blue H 7RX	358.15
Turquoise HA	265.05
Supra Blue H-3RP	595.30
Supra Turquoise H 2G P	181.50
Blue H-FRD	305.80
Navy Blue H ER	333.75
Blue H 5RX	286.20
Navy Blue M 3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H 4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Con.	818.60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp.	693.85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp.	867.45
Brill. Purple 3R Acra Powder	827.05
Brill. Purple 2R Hly. Conc.	744.2
Brill. Purple 4R Supra Disp.	604.2
Brill. Purple 2R Acra Conc.	779.8
Blue 2R Pdr. Fine	675.3
Blue BC Acra Conc. Pdr. Fine	1013.1
Blue BC Conc. Pdr. Fine	713.6
Blue R Conc. Pdr. Fine	719.7
Blue Conc. Powder	645.8
Brill. Blue 2R Hly. Conc.	378.5
Blue RR Supra Powder	629.3
Brill. Blue 2R Supra Disp.	115.6
Dark Blue 2R Powder Fine	512.6
Blue BC Supra Disp.	419.6
Jade Green XBN Powder Fine	555.8
Jade Green XBN Acra Conc. Pdr.	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Pdr. Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779.85
Brown R Pdr. Fine	869.45
Dark Brown 3R Fine	826.25
Brown G Supra Disp.	582.05
Brown 2G Supra Disp.	716.10
Brown R Supra Disp.	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	529.60
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp	415.75
Direct Black AC Pdr. Fine	574.70
Direct Black CH Supra Disp	490.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: SEP:7 (NNS) Sodium dro sulphite Kalali jumped up arply by Rs. 4 at Rs. 46 per kg. in e Delhi chemicals market during st week, on account of dwindling ock., combined with hike in its ices by manufacturers. Damosha nd Tamil Nadu hydro flared up by s. 5 at Rs. 45 each per kg. due to se in demand. Similarly Gulshan ydro moved up by Rs. 2.50 at s. 41 per kg. owing to increased ock tendency. As a result of non nport from Germany, combined ith good demand from gur manu- cturers and acute shortage of tock, rangolite Germany spurted om Rs. 87 to Rs. 90. Chatkolite dged up by Rs. 2 at Rs. 55 in view f fall in fresh supply. Likewise saf- lite looked up by Rs. 3 at Rs. 57 ue to heavy buying interest from tockists. Ammonia bicarb recorded gain of Rs. 20 at Rs. 170 per 25 g. thanks to spurt in demand from akeries along with paucity of upply. Caustic soda flakes hardned by Rs. 20 at Rs. 535 and soda icarb Nal rose by Rs. 10 at s. 330. Borax granular advanced harply by Rs. 35 at Rs. 850 in view f dwindling supply. Borax crystal quoted higher by Rs. 15 at Rs. 875, whereas boric acid technical suffered a steep fall of Rs. 50 at Rs. 515 owing to increased profit taking selling by stockists. Tri sodium phosphate advanced sharply by Rs. 55 at Rs. 625 on account of tight stock and fall in fresh offerings. In view of increased mutual speculation, titanium dioxide RC-822 looked up from Rs. 89 to Rs. 90. Titanium dioxide RCR-2 slipped from Rs. 95 to Rs. 92 in the early part of the week, but later, owing to heavy stockists demand its prices improved sharply and finally settled at Rs. 94, still showing a fall of Re. one per kg. K-brand titanium of Calcutta side ruled quiet at Rs. 62. As a result of increased offerings by stockists and slack demand from Fevicol manufacturers G.H.-17 declined by Rs. 2 at Rs. 133. Hydrogen peroxide moved up by Rs. 100 at Rs. 11, 100 per flask in the absence of demand from consumers. As a result of slack demand from bulk consumers, match wax dropped sharply by Rs. 500 at Rs. 18,500/ton, whereas paraffin wax remained firm at Rs. 1100/50 kg. in view of improved demand from candle manufacturers.

(DELHI MARKET RATES AS ON SEPTEMBER 7, 1990)

mmonia Bicarb (Per 25 Kg.)	170.00
Mercury (Per flask)	11,100.00
Soda ash (Per bag)	360/373.00
mmonium Chloride (50 Kg.)	120/180.00
Caustic soda flakes (50 Kg.)	535.00
Citric acid (Per 50 Kg.)	1,900/2,350.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	101.00
Stable Bleaching Powder KCl (Per 25 Kg.)	90.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	91.00
Stable Bleaching Powder Modi (Per 25 Kg.)	92.00
Sodium Bicarbonate (50 Kg.)	315/330.00
Sodium Hydrosulphite (Per Kg.)	41/46.00
angolite (Per Kg.)	90.00

Tartaric acid France (Per Kg.)	300.00
Sufolite (Per Kg.)	57.00
Chatkolite (Per Kg.)	55.00
DMO (per Kg.)	87.00
Boric acid Technical (Per 50 Kg.)	1,600.00
Paraffin Wax (Per 50 Kg.)	1,110.00
Slack wax (Per metric tonne)	12,000.00
Tartaric Acid (Swastik Per Kg.)	210.00
Borax Granular (Per 50 Kg.)	850.00
Borax Crystal (Per 50 Kg.)	875.00
Sodium Nitrite (Per 50 Kg.)	1,000/1,100.00
Sodium Nitrate (Per 50 Kg.)	500.00
Camphor Thal (Per Kg.)	110.00
Camphor Powder (Per Kg.)	96.00
Menthol Bold (Per Kg.)	335.00
Menthol Medium (Per Kg.)	310.00
Menthol Flake (Per Kg.)	285.00

Mentha Oil (Per Kg.)	195.00
Glycerine (Per Kg.)	55/58.00
Sodium Silicate (Per quintal)	300/400.00
Hexamine (Per Kg.)	34.00
Acetic Acid Glacial (Per Kg.)	13.75
Copper Sulphate (Per quintal)	2,300/2,600
Formic Acid (Per Kg.)	24.00
Formaldehyde (Per Kg.)	8.50
Hydrogen Peroxide (Per Kg.)	38.00
Calcium Carbonate (Per Tonne)	2,800/5,800
Acid Slurry Soft (Per Kg.)	27.00
Acid Slurry Hard (Per Kg.)	32.00
Phosphoric Acid (Per 50 Kg.)	1,235.00
Potassium Nitrate (Per quintal)	1,000/1,250.00
Potassium Permanganate (Per 50 Kg.)	2,600/3,000.00
Sodium Bichromate (Per 50 Kg.)	1,575/1,600.00
Trisodium Phosphate (50 Kg.)	625.00
Titanium Dioxide Anatase T.T.P. (Per Kg.)	65.00
Titanium Dioxide RC-822 (Per Kg.)	90.00
Titanium Dioxide Anatase K-Brand (Per Kg.)	62.00
Titanium Dioxide RCR-2 (Per Kg.)	94.00
Zinc Oxide (Per Kg.)	46.00/50.00
Phenol Carbolic Acid (Per Kg.)	39.00
Carbon Tetrachloride (Per Kg.)	24.75
Chloroform (Per Kg.)	28.00
Sodium Sulphate (Per metric tonne)	3,600/3,900.00
Naphthalene Balls (Per 50 Kg.)	1,350.00
Match Wax	18,500
Residue Wax	3,800

DYES & COLOURS	(Per Kg.)
Naphthol AS	175/211.50
Naphthol ASG	180/249.70
Naphthol ASBS	210/260.75
Naphthol ASTR	300/378.92
Naphthol ASOL	210/250.90
Naphthol ASBO	195/274.30

DIRECT DYES	(Per Kg.)
Black E. Conc.	120/185.30
Diazo Black B.T.	105/154.50
Green B	90/147.55
Blue 2-B	60/107.00
Blue 2-B 225% (JNR)	125.00
Sky Blue FB	160/248.20
Basic Auramine	55/110.00
Basic Rhodamine	300/425.00
Basic Methylene Blue	100/180.00
Basic Violet	165/210.00
Basic Malachite Green	175.00
Acid Orange	75/111.20
Congo Red H/C	75/120.95

Madras Market

There is an upward swing in the market presumably for no reason. Solvent prices have shot up noticeably. Ethyl Acetate was quoted Rs. 21/- against last week's rate of Rs. 18/-. Similarly, Acetic Acid prices were Rs. 2/- higher than the previous week. On account of shut down at NOCIL plant, NOCIL products were in demand specially IPA whose price went upto Rs. 36/kg. Butyl Acetate prices were also high.

There was good upcountry demand for MEK pushing its prices to Rs. 38/- . There has not been much change in the inorganic chemicals prices. The market is expecting a steep price increase in petroleum products on account of Gulf surchage that may be imposed by the Government any moment.

CALCUTTA MARKET
(Prices as on Sep. 9, 1990)

Acetic acid (per 50 kg)	750.00
Basic chrome sulphate (per 50 kg)	800.00
Benzene (litre)	11.50
Bleaching powder (bag)	235.00
Borax granular (per 50 kg)	800.00
Boric acid (per 50 kg)	1,625.00
Camphor (per kg)	102.00
Caustic soda lye (per ton)	10,020.00
Caustic soda flakes (per 50 kg)	560.00
Glycerine (per kg)	53.50
Menthol bold (per kg)	570.00
Menthol medium (per kg)	380.00
Menthol small (per kg)	300.00
Phosphoric acid (per 50 kg)	1,400.00
Phenol (per kg)	38.50
Soda ash (75 kg)	395.00
Sodium bichromate (per 50 kg)	1,500.00
Sodium bicarbonate (per 50 kg)	340.00
Sodium nitrate (per 50 kg)	450.00
Sodium sulphate anhydrous (per 50 kg)	320.00
Sulphuric acid (per ton)	2,200.00
Trisodium phosphate (per 50 kg)	610.00
Toluene (litre)	16.50

(MADRAS MARKET RATES AS ON SEPTEMBER 8, 1990)

Acetic Acid Glacial (per kg)	16.00
Aluminium Sulphate Iron free (per MT)	4,000.00
Ammonium Bicarbonate (per 25 kgs)	160.00
Ammonium Chloride (per MT)	2,450.00
Acid Slurry (per kg)	31.50
Barium Carbonate (per kg)	10.50
Barium Chloride (per kg)	9.50
Boric Acid Technical (per kg)	27.00
Bleaching Powder (per 50 kgs)	210.00
Borax (per 50 kgs)	785.00
Caustic Soda Flakes -- Mettur Chemicals (per MT)	11,500.00
Caustic Soda Flakes -- Andhra Sugars (per MT)	11,500.00
Calcium Chloride 70% Solid (per MT)	3,500.00
Calcium Chloride Anhydrous (per MT)	6,000.00
Calcium Carbonate (Activated) (per MT)	6,500.00
Calcium Carbonate (Precipitated) (per MT)	5,600.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	135.00
Pure Para Cresol 96% (per kg)	90.00
Meta Para Cresol 42% (per kg)	51.00
Formic Acid (per kg)	27.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine I.W. (per kg)	51.00
Hydrosulphite of Soda (TCPL) (per kg)	38.00
Hydrosulphite of Soda (IDI) (per kg)	42.00
Hydrosulphite of Soda (BASF) (per kg)	48.00
Hexamine (per kg)	31.50
Hyflosupercell (per kg)	23.00
Hydrogen Peroxide (per kg)	38.00
Litharge (per kg)	38.00
Lead Acetate (per kg)	38.00
Magnesium Carbonate (per kg)	18.00
Magnesium Chloride (per kg)	3.90
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	345.00
Oxalic Acid (per kg)	20.00
Paraffin Wax (per kg)	18.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	29.00
Polyvinyl Alcohol Powder (per kg)	140.00
Pentaerythritol (per kg)	52.00
Phthalic Anhydride (per kg)	36.00
Soda Ash (TAC) (per 75 kgs)	410.00
Soda Ash (TATA) (per 75 kgs)	410.00
Sodium Bicarbonate (TATA) (per 50 kgs)	385.00
Sodium Silicate (per MT)	3,750.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	24.00
Sodium Sulphide Flakes (per kg)	20.00
Sodium Bisulphite (per kg)	8.00
Sodium Alginate (per kg)	295.00
Sodium Acetate (per kg)	7.50
Sodium Sulphate (Anhydrous) (per kg)	4.00
Titanium Dioxide (Anatase) (per kg)	63.00
Titanium Dioxide (Rutile) (per kg)	85.00
Trisodium Phosphate (per kg)	10.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	52.00
Zinc Chloride Powder (per kg)	14.00
Zinc Sulphate (per kg)	8.50

SOLVENTS

Acetone -- HOCL (per kg)	18.50
Butanol (per kg)	37.00
Butyl Acetate (per kg)	44.00
Benzene (per lit)	14.00
Cellosolve (per kg)	65.00
Carbon Tetra Chloride (per kg)	23.00
Chloroform (per kg)	28.00
Diacetone Alcohol (per kg)	30.00
Diethylene Glycol (per kg)	32.00
Dichloroethane (per kg)	18.00
Di-octyl Phthalate (per kg)	48.00
Di-N-butyl Phthalate (per kg)	48.00
Ethyl Acetate (per kg)	21.00
Isopropyl Alcohol (per kg)	36.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	23.00
Methyl Ethyl Ketone (per kg)	38.00
Methyl Isobutyl Ketone (per kg)	42.00
Phenol (per kg)	38.00
Sorbitol (per kg)	15.00
Triethanolamine (per kg)	90.00
Trichloroethylene (per kg)	26.50
1-1-1 Trichloroethane (per kg)	29.00
Turpentine (per lit)	16.00
Toluene (per lit)	14.00
Xylene (per lit)	22.00

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Approx. sailing dt (5)
15/9	Bravo Sif (Voy-639)	Patvolk/P&O/ S.W. & Co. Trident/ Seaspeed	S. American Ports. (Carting at T.P. No. 4 for S.W. & Co. & Trident & T.P. No. 3 for P & O) (Carting at Hay Bunder No. 4 for Patvolk) New York; Norfolk; Savannah; Baltimore; Boston; Charleston; Houston. New York; Baltimore; Norfolk; Savannah; Charleston; Houston & S. American Ports. (Carting at M-178 Cotton Depot).	19/9
22/9	CMB Mallet (Nhava Sheva)	C.M.B.	Norfolk; New York; Baltimore; Philadelphia; Charleston; Savannah; Houston; Miami; New Orleans Via Antwerp; Montreal; Toronto; Halifax. (Carting at Kalamboli)	24/9
18/9	Maersk Clementine (Sing)(V-9018)	Maersk Agency	New York; Philadelphia; Baltimore; Norfolk; Charleston; Savannah; Jacksonville; Miami; New Orleans; Houston; Toronto; Montreal; Chicago; Atlanta; Denver; Dallas; Wilmington; Milwaukee; Detroit; Mineapolis; Memphis; Nashville; Cleveland; Phoenix; Boston; Los Angeles; Vancouver; Seattle; San Francisco; Portland; Longbeach; Mexican & S. American Ports. (Carting at 19-ID).	22/9
19/9	Kabirdas (Ind)	S.C.I.	New York; Baltimore; Savannah; Norfolk; Charleston; Houston; Jacksonville; New Orleans; Boston; P. Everglades. (Carting at B. Pier Extn.)	23/9
19/9	Ever Bridge (Voy-038)	Greenways	New York; Newark; Baltimore; Charleston; New Orleans; Houston; Boston; Providence (RI); Philadelphia; Norfolk; Savannah; Jacksonville; Wilmington; Miami; Montreal; Toronto; Bermuda; Los Angeles; Longbeach; San Francisco; Oakland; San Diego; Stockton; Richmond; Almeida; Redwood City; Sacramento; Seattle; Portland; Vancouver (B.C.); Tacoma; Longview; Chicago; Dallas; Various inland destinations and Caribbean Ports. (Carting at G/H Cotton Depot).	25/9
20/9	Hoegh Dyke	Patvolk	Montreal & Toronto via Halifax; New York; Boston; Norfolk; Charleston; Houston; Savannah; Wilmington; Philadelphia; Baltimore; New Orleans; & FCL Chicago; Milwaukee; Atlanta; Dallas. (Carting at H.B. No. 5).	25/9
28/9	Stonewall Jackson (Ame)	M.S.P.L.	Philadelphia; Baltimore; Norfolk; New Orleans; Houston; Savannah; New York. (Carting at P/Q-PD).	29/9
15/9	Bravo Sif	Patvolk/P&O/ .S.W. & Co./ Seaspeed	West African Ports. (Carting at T.P. No. 3 for P&O & No. 4 for S.W.& Co.) (Carting at Hay Bunder No. 4 for Patvolk). West African Ports. (Carting at M-178 Cotton Depot)	19/9
22/9	CMB Mallet (Nhava Sheva)	C.M.B.	Lagos; Abidjan; Lome; Douala; Matadi; Port Gentil; Pointe Noire; Nouakchott; Cotonou; Dakar; Luanda; Monrovia; Tema via Antwerp. (Carting at Kalamboli).	18/9
18/9	Maersk Clementine	Maersk Agency	Lagos/Apapa; Dakar; Freetown; Monrovia; Lome; Cotonou; Doula; Tema. (Carting at 19-ID).	22/9
21/9	Oyster Bay (Voy-4053)	Arebee	Lagos/Apapa; P. Harcourt; Abidjan; Tema; Takoradi; Monrovia; Lome; Freetown; Cotonou; Douala; Matadi. (Carting at M-Jetha C.D.).	23/9
14/9	Ville De Dubai (Ger) (V-2122)	C.M.A.	Alexandria; Marseilles; Istanbul; Lisbon; Barcelona; Le Havre; Hamburg; Felixstowe; Thames Port (London); Rotterdam; Antwerp; Limassol; Lattakia; Tunis; Copenhagen; Aarhus; Gothenburg; Stockholm; Helsinki; Belfast. (Carting at E-Grain Depot).	20/9
15/9	Bravo Sif (Voy-639) (Dan)	Merzario/	Jeddah; Hodeidah; P. Sudan; Ravenna; Ancona; Piraeus; Venice; Trieste. (Carting at M.O.D. No. 2).	19/9
		Seaspeed/	Tilbury; London; Felixstowe; Manchester; Liverpool; Avonmouth; Le Havre; Rotterdam; Hamburg; Antwerp; Bremerhaven and Sandinavian Ports. (Carting at M-178 Cotton Depot)	
		S.W. & Co./ Trident/ P&O/	Tilbury; London; Felixstowe; Avonmouth; Manchester; Liverpool; Glasgow; Leeds; Birmingham; Dublin; Belfast; Bristol; Marseilles; Genoa; Barcelona; Le Havre; Antwerp; Rotterdam; Hamburg; Bremerhaven; Copenhagen; Oslo; Helsinki; Malmao; Gothenburg; Stockholm; Aarhus; Alborg. (Carting at T.P. No. 4 for S.W. & Co., Trident & T.P. No. 3 for P&O).	

1)	(2)	(3)	(4)	(5)
		Patvolk	U.K.; N. Continent & Med. Ports. (Carting at Hay Bunder No. 4).	
22/9	CMB Mallet (Nhava Sheva)	C.M.B./ Merzario	Port Sudan; Jeddah; La Spezia; Valencia; Genoa; Barcelona; Marseilles; Tunis; Casablanca; Tangier; Alexandria; Piraeus; Mersin; Limassol; Felixstowe; London; Liverpool; Manchester; Birmingham; Avonmouth; Dublin and all inland destinations in U.K.; Antwerp; Rotterdam; Hamburg; Bremen; Leixoes; Lisbon; Copenhagen; Oslo; Gothenburg; Stockholm; Malmao; Aarhus; Helsinki. (Crtg. at Kalamboli for both).	24/9
18/9	Maersk Clementine	Maersk Agency	Leghorn; Marseilles; Naples; Barcelona; Bilbao; Bordeaux; Alicante; Genoa; Valencia; Bremen; Jeddah; Antwerp; Rotterdam; Bremerhaven; Hamburg; U.K. & Scandinavian Ports. (Carting at 19-ID).	22/9
19/9	Kabirdas (Ind)	S.C.I.	Felixstowe; Hamburg; Rotterdam; Antwerp; Bremen; Liverpool; Manchester; Avonmouth; London; Belfast; Aarhus; Oslo; Helsinki; Copenhagen; Gothenburg and all Inland destinations. (Carting at B. Pier Exten.)	23/9
19/9	Ever Bridge (V-038) (Pan)	Greenways	Hamburg; Felixstowe; Rotterdam; Antwerp; Le Havre; London; Liverpool; Leixoes; Lisbon; Manchester; Avonmouth; Wembly; Birmingham; Leeds; Leicester; Amsterdam; Bremen; Copenhagen; Aarhus; Gothenburg; Oslo; Stockholm; Helsinki; Belfast and all destinations in U.K.; Germany; Switzerland and Austria. (Carting at G/H Cotton Depot).	25/9
21/9	Oyster Bay	P&O/	Assab; Djibouti; P. Sudan. (Carting at Timber Pond No. 3).	23/9
		Arebee	P. Said; Alexandria; Piraeus; Venice; Trieste; Genoa; Koper; Naples; Fos; Barcelona; Valencia; Ravenna; Livorno; Las Palmas; Limassol; Constanza; Budapest. (Carting at M-Jetha Cotton Depot).	
28/9	Stonewall Jackson	M.S.P.L.	Assab; P. Suez; (Alexandria). (Carting at P/Q-PD).	29/9
18/9	Maersk Clementine (Sin)(V-9018)	Maersk Agency	Penang; Singapore; Hongkong; Keelung; Kaohsiung; Busan; Main Japan Ports; Manila; Jakarta; Surabaya; Bangkok; P. Kelang; Chinese Ports; (Carting at 19-ID).	22/9
19/9	Ever Bridge (V-038)(Pan)	Greenways	Singapore; Penang; Port Kelang; Bangkok; Djakarta; Surabaya; Manila; Cebu; Kaohsiung; Keelung; Osaka; Yokohama; Kobe; Shimizu; Moji; Nagoya; Busan; Hongkong. (Carting at G/H Cotton Depot).	25/9
28/9	Stonewall Jackson	M.S.P.L.	Singapore; P. Kelang. (Carting at P/Q-PD).	29/9
12/9	Ermioni	Jades Ship	Dubai	25/9
14/9	Ville De Dubai	C.M.A.	Dubai; Mina Qaboos; Abu Dhabi; Bahrain; Doha; Dammam; Riyadh. (Carting at E-Shed Grain Depot).	20/9
15/9	Bravo Sif (Voy-639)	Penguin/	Dubai; Abu Dhabi; Sharjah; Doha; Muscat; Jebel Ali; Bahrain. (Carting at H.B. No. 4).	19/9
		Merzario/	Dubai; Sharjah; Abu Dhabi; Muscat; Doha; Dammam; Bahrain. (Carting at M.O.D. No. 2).	
		O.S.A./	Dubai; Abu Dhabi; Bahrain; Doha; Muscat; Dammam. (Carting at M/178-180 Cotton Depot).	
		Seaspeed/	Dubai; Dammam; Bahrain; Doha. (Carting at M-178 Cotton Depot).	
		Kanika/	Dubai; Abu Dhabi; Sharjah; Muscat; Bahrain. (Carting at T.P. No. 3).	
		Parekh	Muscat; Dubai; Sharjah. (Carting at Timber Pond No. 3).	
18/9	Maersk Clementine	Maersk Agency	Dubai; Dammam; Muscat; Bahrain; Riyadh; Doha. (Carting at 19-ID).	22/9
18/9	Rossana (Ind)	Mackintosh	Dubai; Muscat.	26/9
20/9	Lanka Mahapola (Sri L.)(V-98)	Seahorse	Dubai; Sharjah; Muscat; Dammam; Riyadh; Sallalah; Doha; Abu Dhabi; Bahrain. (Carting at M.O.D. No. 3).	22/9
22/9	CMB Mallet (Nhava Sheva)	C.M.B./ Merzario	Dubai; Abu Dhabi; Bahrain; Dammam; Doha. (Carting at Kalamboli for both).	24/9
20/9	K. Medvetskiy	Sai Ship	Mogadiscio; Mombasa; Dar Es Salaam; Beira; Maputo.	25/9
20/9	Any	SDS Corp.	P. Louis; Tamatave; Re Union.	27/9
21/9	Oyster Bay (V-4053)	Arebee/	Dar Es Salaam & Mombasa (Direct); Kampala; Jinja; Toronto; Lugazi; Entebee (Uganda); Kigali (Rwanda); Kitwe; Lusaka; Ndola (Zambia); Lilongwe; Blantyre (Malawi); Maputo; Zanzibar. (Carting at M.J. Cotton Depot).	23/9
		P&O	Mombasa; Dar Es Salaam (Direct); Beira; Mahe & Inland destinations in East Africa. (Carting at Timber Pond No. 3).	
22/9	CMB Mallet (Nhava Sheva)	C.M.B.	Dar Es Salaam; Mombasa (Direct); Nacala; Tanga; Kampala; Blantyre; Lusaka; Ndola; Matwara; Lilongwe and all inland destinations in East Africa. (Carting at Kalamboli).	24/9

VESSELS DUE FOR IMPORT DISCHARGE

Due Date	Steamer's Name	Agents	From
22/9	CMB Mallet (Nhava Sheva)	C.M.B.	UK Cont./US/Med./East Africa
25/9	Gur Maiden	I.S.S. Co.	U.K. Cont.
20/9	Hoegh Dyke	Patvolk	U.S.A.
26/9	Ibn Al Moataz	Transworld	S. America
22/9	Ibn Abdoun	Transworld	S. America
22/9	Ionian Express	S.C.I.	U.S./Canada
25/9	Jala Gopal	S.C.I.	U.S./Canada
28/9	Jala Tapi	S.C.I.	U.S./Canada
20/9	K. Medvetskiy	Sai Ship	E. Africa
19/9	Kabirdas	S.C.I.	U.K. Cont./U.S.
21/9	Oyster Bay	P&O	E. Africa
30/9	Star Rover	S.W. & Co.	U.S./Canada
28/9	Stonewall Jackson	M.S.P.L.	U.S.A.

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2,5, DICHLORO SULFO PHENYL 3 METHYL 5 PYRAZOLONE: To Genoa: Anil Dye Chem Industries, 3,850 Kgs., Rs. 4,04,374.

DIETHYL META AMINO PHENOL: To Piraeus: Navin Chem Inds., 1,000 Kgs., Rs. 1,81,300.

2,4, DI NITRO ANILINE: To New York: Nanavati Services Pvt. Ltd., 1,26,951 Kgs., Rs. 7,30,213.

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ISONIAZID ACID BP'80: To Hamburg: Salpra Pharmaceuticals, 1,00 Kgs., Rs. 1,54,536.

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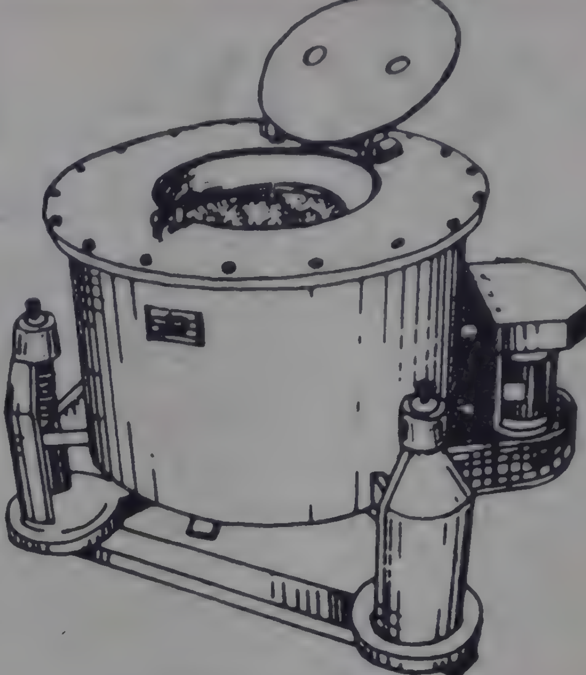

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